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An Address.[1]

ONE HUNDRED YEARS' MEDICAL HISTORY IN SOUTH AUSTRALIA.

By A. F. STOKES, M.B., B.S.,

Retiring President of the South Australian Branch of the British Medical Association.

WHEN I accepted nomination as President of the South Australian Branch of the British Medical Association the thought that seriously disturbed me was the fact that I had to give a retiring presidential address. It has hung over me like a horrid nightmare all the year. However, as our State has celebrated its centenary during part of my term of office it occurred to me that we might well look back and consider with profit and interest what has been accomplished in the medical world of the colony and State during those years, and we might also make a small excursion into the future.

The colonial surgeon supplied the first medical service for the early settlers, but gradually this service was augmented by the arrival of other medical practitioners, and in 1844 it was realized that it would be necessary to control the practice of medicine to prevent unqualified persons holding themselves out as doctors.

The *Medical Act* of 1844 was passed and a medical board was constituted; it consisted of five members. Dr. Nash was the chairman, appointed by the Governor, and Dr. Wyatt was the secretary.

In the minutes of the first meeting there is an interesting entry: a requisition for "a minute book

[1] Delivered at the annual meeting of the South Australian Branch of the British Medical Association on June 23, 1937.

(still extant), one quire of foolscap, one ream of blotting paper, one bottle of ink, some sealing wax, steel pens and five chairs". I do not know where the members of the board met, but there was obviously no seating accommodation.

The Act was amended in 1880, 1889 and again in 1919, the amendments being mainly concerned with reciprocity with other countries and the required length of study before registration could be granted. In 1889 the first graduates of our university were registered, the late A. F. Lynch being the first of them.

In the early days of South Australia locomotion was not easy; there were no roads, just tracks; and doctors reached their patients either on foot or horseback, their armamentarium in the latter case no doubt being carried in saddle bags. As time went on roads began to appear, and the doctor was seen travelling to his patients in gig, dogcart, victoria *et cetera*. The older men here can well remember J. C. Verco in his pillbox, Ben Poulton in his hansom, W. T. Hayward in his gig, J. A. G. Hamilton in his high buggy drawn by beautiful horses, C. E. Todd in his smart victoria, to mention a few of the old identities. Wyatt, Mayo, Gerger and Gosse were well known figures earlier still.

Men in the country often had to travel forty, fifty and even one hundred miles to see one patient, and perhaps spend twenty-four to forty-eight hours over the case. In the early part of this century, with the advent of the motor car, the transport question was to some extent solved—travelling time was halved, provided the one or two cylinder engine continued to chug; tires were indifferent (three thousand miles was a good life for one), punctures were frequent, and lights were poor and uncertain. Even as late as 1910, when I started practice in the country, motor cars and their appurtenances were still very unreliable; and I can well remember on a pitch dark night, on a two-chain road, creeping along with the fence as a guide because my acetylene generator had ceased to function and the only light I had was that of my kerosene side-lamps. Now, with the modern high-powered motor car, one can be certain of getting anywhere; the surgeon can take as large an outfit of instruments as he may require: diathermy and light plants, even an operating table; the radiologist has a portable X ray machine; and we even see the modern anæsthetist travelling with a miniature pantechnicon of apparatus.

For long distances and fast transport there is the aeroplane to take the consultant to any part of the country, or the patient may be brought in the same manner to the city, if necessary comfortably lying on a stretcher.

The great inland spaces of our State have been already partly supplied with a medical service by the Australian Inland Mission; and now this "Flying Doctor" work has been taken over by "Australian Aerial Medical Services", and when the new base operates at Broken Hill practically the whole of inland South Australia will be covered.

Our Branch is a foundation member of the South Australian branch of this organization.

After the Crimean War in 1852 Florence Nightingale started the training of nurses; and although their numbers steadily increased and they became more and more efficient, it was not until 1920 that they received official status by the passing of the *Nurses Registration Act*. South Australia was the first State to pass such an act, and it followed shortly after the passing of a similar act in England.

Possibly the late recognition of the "trained nurse" was largely due to sentiment. Women for their confinements liked the old midwife. "She was such a motherly old soul". However, since 1920 "Sarah Gamp" and the "lady from next door", with their dirty hands and crude ideas of cleanliness, have disappeared from view, adding greatly to our peace of mind and the safety and comfort of our patients. We no longer see the chamber-pot ready to receive the placenta, and the family wash-basin for the mixing of lotions.

It is, however, a curious anomaly that the registration of doctors was recognized as necessary as early as 1844, but it was not until over seventy years later that the nursing profession was put on a proper basis.

In 1879 this Branch of the British Medical Association was formed, mainly through the efforts of W. Gosse, T. Corbin, W. L. Cleland, W. Gardner and T. Cawley. It was felt that the profession should be united together for its own benefit, and also that it might make its voice heard in any matters concerning the health and well-being of the community. W. Gosse was the first president and W. L. Cleland was the first secretary.

There are now over 370 members of the Branch, and it includes most of the men actively practising their profession in the State. Your council is ever on the alert to watch the interests of the members and of the community. Fair terms for contract practice have been fought for with the friendly societies, the Government services, and guarantors of medical practices in outlying country centres.

Legislation affecting the profession has been watched, and efforts have always been made to have any anomaly or injustice altered. Much has been done for the benefit of the people, and it is largely owing to the work of your council that the State medical services have been reorganized under a director-general of medical services (responsible to the Minister) and under him directors of tuberculosis and mental hygiene. It is hoped that in the near future he will control all the other medical services of the State.

At present our Branch has no home of its own, but it is to be hoped that in the near future we may be able to have a building for our use. There is no reason why it should not become an accomplished fact, if every member gives the project his whole-hearted support and, in rowing parlance, "pulls his weight".

Prior to 1879 there had existed a South Australian Medical Society (chiefly renowned for vigorous and fiery quarrels amongst its members); but as a result of the formation of this Branch of the British Medical Association it voluntarily became extinct. The society had moneys amounting to £197, and this sum was vested in trustees to form the nucleus of a medical benevolent fund. The capital now amounts to about £3,500. The association has helped the dependants of many deceased members and is still doing so.

The South Australian Branch early made an attempt to divest itself of its responsibilities in regard to contract practice, and this burden was assumed by a separate "Association of the Registered Medical Practitioners of South Australia". Later the Branch resumed control and this association became the "Medical Defence Association", which has proved to be an immense benefit to the profession.

In October, 1928, the Permanent Post-Graduate Committee was formed, and since then has provided refresher courses for the general body of the profession, and much good work has been done. The committee is composed of representatives of the Branch, the teaching hospitals and the university.

In October, 1886, this Branch started a movement for the holding of an Australian medical congress in Adelaide at the time of the opening of the Jubilee Exhibition in 1887. It became an accomplished fact, and the first Intercolonial Medical Congress held in Australia was successfully inaugurated on Tuesday, August 30, 1887. J. C. Verco was the president, and B. Poulton secretary. The congress was opened by His Excellency the Governor, Sir William Robinson; there were 155 present, one member coming from as far as Fiji. The congress was an unqualified success. The Australasian Medical Congress (British Medical Association), to be held in Adelaide in August of this year, is the lineal descendant of the first Intercolonial Medical Congress held fifty years ago. The last one held here was in 1905, and it behoves every member of the Branch, by his support and enthusiasm, to make the 1937 meeting a worthy successor of its parent, and a credit to this Branch and our State.

Sir Henry Newland, as President of Congress, is a tower of strength in himself, and his energy and the work of the Joint Honorary Secretaries, Dr. Alan Lamphee and Dr. C. B. Sangster, should fire the rest of us with zeal.

In 1885 the Medical School at the University of Adelaide was opened. There have been many renowned and able men on the teaching staff. Archibald Watson, the first to hold the Elder Chair of Anatomy, was a remarkable man and a great anatomist. To many of the younger men he is a myth surrounded by wonderful stories, but to the older graduates he is still a very live memory. Edward Stirling, the first Professor of Physiology, is probably better known for his discovery of and work on the diprotodon, a prehistoric mammal found in central Australia, where he did some exploring. His garden parties after the November examination were a great institution for teacher and student alike. Many brilliant men have graduated in this school. Some have left the State and made their mark elsewhere; others are still with us.

In 1914, when the Great War broke out, members of our profession freely gave their services both abroad and at home, many of those on active service winning awards for bravery in the field and for other outstanding work. Some few paid the supreme sacrifice; others who returned have since had their lives shortened by their war service.

Members of our profession have given their services to the State in the political world. John Cockburn became a Minister of the Crown. E. C. Stirling and S. J. Magarey also sat in Parliament. Cockburn later represented the State as Agent-General.

In the "Centenary History of South Australia" F. S. Hone points out that when the colony was founded the land was free from epidemic and endemic disease, but before long, however, infections were introduced. Bubonic plague affected Port Adelaide only once, and smallpox secured only a temporary and local footing.

Tuberculosis appeared early in the colony and became serious in the latter half of the last century, owing to the indiscriminate dispatch of consumptives from Britain.

Other infectious diseases appeared at intervals. Diphtheria caused serious ravages amongst the children, and an epidemic at Glenelg seventy years ago caused many families to lose two and three children within a few hours.

Until there were proper conservation of water, control of food supplies (particularly milk) and deep drainage, gastro-intestinal infections were the worst diseases, typhoid fever being the most serious till recent times, when cases, at least in private practice, are rarely seen.

The first reservoir was constructed in 1858 and water was reticulated in 1860. Water sewerage was started in Adelaide and suburbs in 1878; and the use of the bacteriolytic tank further afield in later years, combined with the discovery of "carriers" and protective immunization, has reduced the incidence of enteric fever in this State to infinitesimal proportions.

Immunization against diphtheria within the last few years should reduce the incidence of this disease, as more and more of the juvenile population are protected. Many local boards of health have carried out a programme of immunization. In the town of Brighton last year about 80% of children up to twelve years of age were treated, with the result that, in nearly a twelve-month period, only two cases of diphtheria have occurred, and they were imported from elsewhere.

To quote F. S. Hone again:

> Under the guidance of the medical scientist the crude death rate has fallen during the last fifty years from fifteen deaths per thousand of population to 8·5 in the last quinquennium.

Under the same scientific guidance infant mortality has been reduced, until in 1933 it was as low as 33 per thousand, a figure which only New Zealand seems to equal in the world.

The hospital history of the colony and State dates back to 1837, when a small thatched hut (18 by 12 feet) was built on North Terrace near Trinity Church. In 1840 a hospital was erected on the site of the old Infectious Diseases Hospital on North Terrace. This building was on the east side of the grounds, and was built partly from public subscription and partly from Government grant. It was subsequently used as part of the Lunatic Asylum, which was built in 1852.

The Adelaide Hospital was erected on the present site in 1856, and has gradually been expanded to its present size, with corresponding increase in its honorary and paid staff. At the end of 1936 there were 132 doctors on the honorary staff and about 20 on the paid staff.

Patients with incurable pulmonary tuberculosis and cancer were for many years accommodated first in the hospital and then in the old Lunatic Asylum on North Terrace, until the Morris Hospital at Northfield was opened in November, 1931. Patients with infectious diseases were also treated in part of the old asylum until the Metropolitan Infectious Diseases Hospital at Northfield was opened in October, 1932.

The Bedford Park Sanatorium was established in 1917 for the treatment of returned soldiers, but in 1926 the policy was modified for the admission of civilian patients.

In 1917 "Mareeba" Babies' Hospital at Woodville was opened, with accommodation for seventy babies.

The first Government country hospital was opened at Mount Gambier in 1869, and since then the hospital system has been steadily expanded, till at the present day there are seven Government country hospitals and thirty-nine hospitals subsidized by the Government.

Mental defectives were at first accommodated in part of the Adelaide Gaol, but in 1846 this practice was abolished by proclamation and a temporary house for lunatics was provided on the site of the Parkside Asylum, which was opened in 1870. In 1852 the asylum on North Terrace was built, and this institution was closed in 1901. Under the *Mental Defectives Act* of 1913 the Parkside Asylum was proclaimed a mental hospital, and under the same act the Enfield Receiving House was opened in June, 1922; and this institution has proved of great benefit to the public, many patients having passed through it, thus avoiding the stigma of being certified as mental defectives.

In 1929 the Northfield Mental Hospital, situated on a block of 500 acres, was opened, and here higher grades of mental defectives are employed at farming, gardening *et cetera*, thus enjoying some congenial and healthy occupation.

Private generosity has done much for the relief of the suffering poor. The Children's Hospital was established sixty-one years ago as an outdoor dispensary in Currie Street. Then the "Way Wing" was built on the present site, and every few years since then further additions have been made, till at the present day there is an average of 141 beds occupied and a daily attendance of 170 out-patients. Associated with the hospital is the convalescent home at Mount Lofty, and the hospital also had more than 30 children suffering from bone and joint tuberculosis at Estcourt House at the Grange.

At the beginning of this century the Queen's Home for lying-in patients was opened and has gradually been extended. It is the training school for students and nurses.

Various subsidiary institutions have been opened through public philanthropy to assist the active hospitals in the care of the needy sick.

Kalyra Sanatorium for early pulmonary tuberculosis, Minda Home for weak-minded children, Saint Margaret's Convalescent Home at the Semaphore, and The Home for Incurables at Fullarton are all assisting in looking after those who are unable to care for themselves, and associated with them all are men of our profession, some of whom are willingly giving their services in an honorary capacity.

What of the future? The most important public question that will affect our profession is national health insurance. Dr. Lindsay A. Dey, President of the New South Wales Branch of the British Medical Association, chose the subject for his presidential address (see THE MEDICAL JOURNAL OF AUSTRALIA, April 10, 1937). Dr. John Hunter, Secretary of the New South Wales Branch, went to England to make inquiries at first hand. Sir Walter Kinnear came from England to advise the Commonwealth on the financial side of the question. There will certainly be a general practitioner service, and probably a specialist service.

Your council this year has had lodge surgeons' fees restored to those of the Model Lodge Agreement, having for six years given the friendly societies a concession in fees owing to the financial depression and consequent unemployment. It was felt that we had carried the baby long enough; but there was more in it than that. The Model Lodge Agreement must be revised shortly, and in view of the possibility of national health insurance, we must have the best possible conditions for contract work, because it must be on such a basis that national health insurance will be founded.

Medical service under national health insurance seems satisfactory in England; it remains to be seen whether it would satisfy Australian conditions.

The hospital service in this State, in my opinion and in that of many others, needs revising. The Adelaide Hospital in particular and the Children's Hospital are becoming top-heavy. The Adelaide Hospital is the biggest general hospital in Australia, and the work there could be much relieved by the founding of intermediate hospitals, say, north, south, east and west of Adelaide. Each would require a small X ray plant, but the labora-

tory service could be undertaken at the Government laboratory.

A small out-patient department could be provided for the treatment of poor and indigent patients, and in special cases they could be referred to the Adelaide Hospital for specialist treatment.

At the present time we are breeding a large hospital class of patients who should not, and many of whom would prefer not, to belong to that category. But the middle class population is not able to afford the many special examinations which help to complete a modern diagnosis. To give them the same advantages in this direction as the poorer classes, doctors have to send their patients to the Adelaide Hospital, where they have to accept a charity which the majority do not want. Ten years ago the *amour propre* of these people would not have allowed them to accept free medical service. Times have changed, and now, when any special service is suggested, the patient immediately says: "I am afraid, doctor, I must get you to give me an order for the Adelaide Hospital." It may be asked: "What about the financial aspect of the problem?" Well, as ratepayers we are rated for the upkeep of the Metropolitan Infectious Diseases Hospital. Should not the Government levy a special hospital tax and make the whole community responsible for a hospital service?

Preventive medicine is becoming more and more important. Notification of infectious diseases has done much towards controlling them, but there are still many loopholes of escape. Heads of families do not realize that it is their responsibility to report infectious disease, the consequence being that unless a doctor is called in, infectious diseases are broadcast through lack of proper isolation.

The notification and hence the segregation of venereal disease patients is still a vexed question; but more efficient treatment and increased public knowledge of the matter have certainly reduced their incidence, at least in general practice.

In the past thirty years the tuberculosis death rate in this State has been halved, and with steady work along the lines now adopted an even greater improvement will be effected. In 1899 pulmonary tuberculosis was declared a notifiable disease, and the fall has occurred during a time when the State's population has almost doubled.

Pulmonary tuberculosis accounts for approximately 90% of deaths from all forms of tuberculosis; but, whereas thirty years ago it was responsible for over 10% of deaths from all causes, in 1936 it accounted for less than 4% of total deaths. These figures can be made still less by our tuberculosis clinic, by greater control of sufferer and contacts, and by removal of financial anxiety from those infected, more particularly heads of families.

To get a Commonwealth invalid pension a sufferer from pulmonary tuberculosis must be certified as incurable; this is wrong and is only "shutting the stable door after the horse is stolen".

Many contacts refuse the service of the clinic because they are afraid of being told that they are infected; that being so, unless education can succeed, compulsion must interfere with individual liberty for the good of the whole community.

THE BRONCHO-PULMONARY SEGMENTS: RADIOLOGICAL, PATHOLOGICAL AND BRONCHOSCOPIC CONSIDERATIONS, WITH SPECIAL REFERENCE TO THE SUBAPICAL BRONCHO-PULMONARY SEGMENT.

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SURVEY OF THE AVAILABLE LITERATURE.

IN 1932, Kramer and Glass stressed the constancy (15% variation) of the intrapulmonary distribution of the secondary and tertiary bronchi. Each tertiary bronchus is connected with a definite pulmonary area and forms a broncho-pulmonary segment. These segments are easily recognized pathologically and radiologically as separate entities in the evolution of such diseases as pulmonary tuberculosis, lung abscess, lobar pneumonia, bronchiectasis and atelectasis (bronchial occlusion).

Each broncho-pulmonary segment, except those connected with the distribution of the mesial bronchus of the right lower lobe, is projected on the chest wall. All segments may be identified on radiographic films, and, although it is a commonplace, the importance of expert radiographic interpretation can be stressed again with advantage. In 1934 Nelson based his technique for the efficient continuous postural drainage of bronchiectatic areas on the constancy of the distribution of the bronchi. His anatomical researches are in general support of the findings of Kramer and Glass.

The study of diseases of the bronchi by ordinary bronchography has not materially refined our conceptions of bronchial anatomy. The majority of published bronchograms, even those labelled normal, show a haphazard filling of the bronchial system, with overfilling of some of its segments and nonfilling of others. The routine interpretations do not attempt precise broncho-pulmonary localization. These faults appear to arise from failure to realize that the bronchial tree may be investigated in an orderly fashion.

The successful diagnosis and treatment of certain broncho-pulmonary diseases, especially lung abscess, bronchial occlusion and bronchiectasis, are based on information supplied by the radiologist and bron-

choscopist. An intelligent bronchoscopic survey of these diseases, as well as their accurate localization by X rays, depends on precise knowledge of (*a*) the general orientation of the bronchial system, (*b*) the relationship of the individual bronchi to the main stem and to one another, (*c*) the area of lung served by each bronchus, and (*d*) the surface markings and radiographic projections of these areas on the chest wall.

This precise knowledge does not readily follow from a study of the standard text-books of anatomy, bronchoscopy and radiology. We have tried to obtain a more coherent mental picture of the bronchial system by approaching the problem from different angles. Some of our relevant findings are presented in this discussion with the hope that others will be stimulated to increase our knowledge in this regard.

This dissertation is based on: (i) a survey of available literature; (ii) dissection of formalinized lungs and inflation of their individual broncho-pulmonary segments; (iii) construction of fusible metal casts of the tracheo-bronchial system and plaster casts of the lungs: (iv) bronchoscopic examinations and the filling of single broncho-pulmonary segments with iodized oil through the bronchoscope for radiographic studies by postero-anterior, lateral and stereoscopic films. The prevailing use of relatively large quantities of opaque oil in ways that place the openings of certain important bronchial divisions out of the stream of the inflowing oil adds to the confusion.

The most effective investigations in the circumstances combine bronchoscopy and radiology and are based on clear ideas of the anatomy of the bronchi. The data obtained give information concerning every bronchial division, with exact details of the extent and localization of disease processes in terms of the broncho-pulmonary unit affected.

Dissection of Formalinized Lungs and Inflation of their Individual Broncho-Pulmonary Segments.

The lungs and trachea are removed from the cadaver and treated according to the method described by Mooltan. After two or three days the fully expanded lungs have the bronchial orifices gaping permanently, and in this condition they are ideal for bronchoscopic examination. It is essential that the dissection be done with fingers and blunt-pointed scissors of the Mayo type. The dissection is commenced at the trachea and an easily separated connective tissue plane will be found surrounding the main and secondary bronchi. All the divisions to be described in a subsequent section will be found by careful search. (Figures XIX and XX.)

Failing facilities for the Mooltan method, fresh autopsy lungs may be immersed in a 5% formalin solution for twenty-four hours. They are then drained, trachea downwards, or suctioned, and are almost as useful for general purposes as those prepared by the Mooltan method.

Wrapping specimens in the following preserving fluid will keep them soft and pliable. Two hundred grammes of arsenate of soda are boiled in three litres of water and added to seven litres of tap-water in which a kilogram of acetate of soda has been dissolved. Three litres of glycerine are then added.

Our experience follows that of Kramer and Glass and Nelson in finding the bronchial system distributed with a constancy in the usual range of anatomical variation found generally in dissection.

When the dissection has bared each tertiary bronchus for half to one inch of its extent, the bronchial tree may be incised along its anterior aspect and each bronchus entered in turn by a Higginson's syringe for inflation of the corresponding broncho-pulmonary segment. This shows dramatically the sharp delineation of each tributary segment. This procedure has many advantages over any previously described methods of defining the broncho-pulmonary segments, and places their study within the reach of each practitioner.

Construction of Fusible Metal Casts of the Tracheo-Bronchial System and Plaster Casts of the Lungs.

Wood's fusible metal (tin one part, cadmium one part, lead two parts, bismuth four parts) was used in the preparation of casts of the bronchial system. One pound is usually needed for an adult filling. When these elements have been fused in a crucible the resulting alloy melts at the temperature of boiling water. As the compound cools quickly, casts made immediately after the boiling water is discarded show the main stem bronchi only. Such casts are of no value for the study outlined.

Technique.—With the lungs *in situ* in the cadaver, with the thorax and abdomen unopened, the trachea is opened and preliminary suction of the main bronchi is undertaken. The ladle in which the metals are being fused is kept over the Bunsen burner for an extra minute after the alloy has become completely mobile. This will give a temperature of about 300° F. Then it is poured directly through an enamel or tin funnel into the tracheal opening, with the subject as nearly as possible in the vertical position. The funnel used in the trachea should have a metal tube down within and beyond the spout, to allow the gases to escape from the trachea and to avert spluttering of the metal which is poured in quickly in a steady stream. A few minutes should then be allowed for the metal to cool.

The thorax is opened and the lungs are removed, care being taken not to injure the peripheral bronchi. The pleuræ and some of the surface of the lungs are stripped off and incisions one or two inches deep are made into the pulmonary tissue, the palpable bronchi being avoided. The specimen is immersed in a 25% solution of caustic potash for forty-eight hours. Starting from the tracheal end with toothed forceps and a scalpel, the tissues are drawn away and the cast is released. Shreds of *débris* caught in the bronchial junctions are pulled off in a peripheral direction. At times, under

favourable conditions, the pulmonary alveoli will appear in different areas on the casts.

Plaster casts were made from inflated lungs. They served for marking the surface topography of the broncho-pulmonary segments.

Bronchoscopic Examinations and the Filling of Single Broncho-Pulmonary Segments with Iodized Oil through the Bronchoscope for Radiographic Studies by Postero-Anterior, Lateral and Stereoscopic Films.

This approach to our problem makes full use of the knowledge of bronchial anatomy and orientation acquired from the dissections of the lungs and the inflation of the broncho-pulmonary segments. In general it may be emphasized that effective bronchoscopy and radiographic interpretation cannot be expected without the actual experience of these simple studies. The lungs to be dissected are used before incision for bronchoscopic examinations, in which it is possible to become familiar with the characteristic shapes and locations of the bronchial orifices.

Radiographs of these specimens with the individual broncho-pulmonary segments filled with iodized oil do not help our study, as the bronchial relationships to the lung as a whole are indefinite and distorted. To overcome this difficulty, individual bronchi have been filled in the patients referred to the clinic for bronchoscopy. They are usually suffering from lung abscess, lung tumour, bronchial occlusion, bronchiectasis, hæmoptysis of unknown origin or undetermined dyspnœa.

Insertion of the Bronchoscope.—Respecting the usual and obvious contraindications, the adults to be investigated are given a hypodermic injection of 0·076 gramme (one-quarter of a grain) of morphine and 0·65 milligramme (one one-hundredth of a grain) of atropine at least one hour before the examination.

The fauces, base of the tongue, pharyngeal walls and as much as possible of the pharyngeal surface of the epiglottis are sprayed with a dozen blasts from a "de Vilbiss" spray containing a solution of equal parts of 10% cocaine and adrenaline. With the patient holding his tongue, six more blasts are directed on the laryngeal entrance under guidance of a mirror. One cubic centimetre of the solution is then trickled into the larynx. Twenty minims of the mixture are then diluted to sixty minims by adding normal saline solution or water. A few drops of this weakened solution are trickled down the laryngeal surface of the epiglottis. In a short time, with subsidence of the initial irritation, the remainder is gradually inserted. The patient is then placed on the table and the bronchoscope is introduced. The whole process takes about ten minutes.

If coughing occurs on reaching the area to be explored, ten minims of the diluted solution are poured down the bronchoscope after any necessary aspiration. This ensures quiet working conditions. A suitable brass tube of small calibre, either straight or flexible, curved previously and filled to its capacity with lipiodol, is inserted into the bronchial opening selected for examination. One extra cubic centimetre of iodized oil is slowly added from a syringe. This amount is quite sufficient for the radiographic examination of the individual segment.

Bronchoscopic Orientation.

Right Lung.

The orifice of the bronchus for the upper lobe is met on the lateral wall of the main stem one centimetre after passing the carina. That of the middle lobe arises from the anterior aspect of the stem 2·5 centimetres lower. One or two millimetres more distally the opening of the apical bronchus of the lower lobe is seen on the posterior (and slightly lateral) aspect of the main stem, and one or two millimetres lower on the mesial side is the orifice of the mesial bronchus. These last three openings can be regarded as anatomical constants.

One centimetre further down on the lateral side is encountered the opening of the antero-lateral bronchus (or bronchi) of the lower lobe. In some instances there are two separate orifices. The proximal serves the anterior and the distal, the lateral portion of the segment. About one and a half centimetres lower is encountered the final division of the main stem into the postero-lateral, which is placed laterally, and the paravertebral, which is located mesially.

Between the opening of the apical bronchus and the final bifurcation of the lower lobe bronchus there are found one or two bronchial openings on the mesial or posterior aspect of the stem. The proximal one may lie just below the apical bronchus opening, the distal close to the bifurcation. In the absence of their previous designation we have named them the subapical bronchi. They have been present in all the specimens examined by us. They have a very important distribution in the lateral, posterior and mesial aspects of the middle third of the dorsal portion of the lower lobe (subapical broncho-pulmonary segment).

We have found in other specimens a single orifice as large as the apical orifice of the lower lobe and just a few millimetres lower on the dorsal floor, which, when inflated, outlines the whole of the subapical segment. However, this is a variation, many of which are found in examination of a large series of lungs, but do not vitiate the general principles.

Left Lung.

The main stem in the left lung proceeds for about five centimetres from the carina before the opening of the upper lobe bronchus is seen on its lateral aspect. This bronchus divides into the branches which correspond to those of the upper and middle lobes of the right lung.

One centimetre lower in the main stem the apical bronchus of the lower lobe is seen on its posterior aspect. About another centimetre lower on the lateral aspect lies the opening of the antero-lateral bronchus. Distally (at varying distances) are found the orifices of the paravertebral and postero-lateral bronchi. As in the right lung, on the posterior, mesial or lateral aspect of the main stem, may be

found the opening of the subapical bronchus which supplies the middle third of the posterior, lateral and mesial aspects of the middle third of the lower lobe. Occasionally it is absent from the main stem on the left side, and is then found in the proximal end of the paravertebral bronchus. Figure XXI shows the sites and relative distances as the tube goes down from the bifurcation.

Anatomical Orientation.

The diagrams reproduced herewith, showing the distributions of the broncho-pulmonary segments, have been modified from those of Kramer and Glass in accordance with our observations. They can be readily followed without any descriptive text (Figures I, II, III and IV).

Radiographic Orientation.

It is recognized that normality extends over a wide range. In our discussion of the positions of these anatomical structures this fact is acknowledged and attempts to associate the bronchial origins and distributions with external landmarks on the chest wall are offered to help the description and not to establish minutely rigid formulæ.

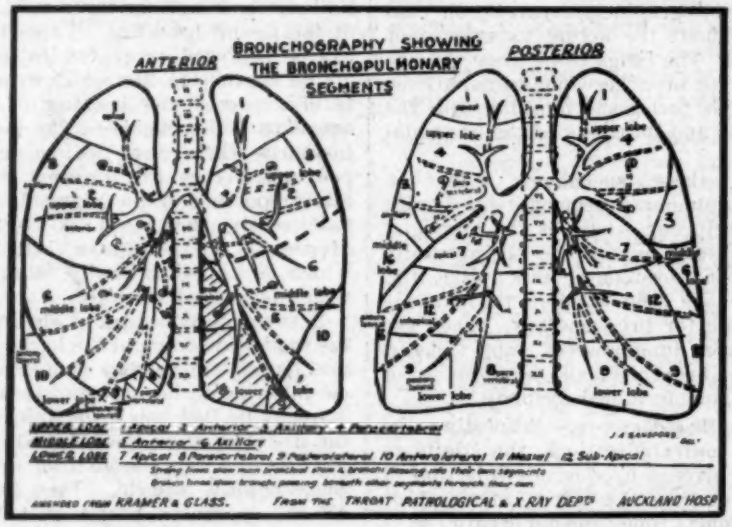
BRONCHOGRAPHY SHOWING
THE BRONCHOPULMONARY
SEGMENTS
ANTERIOR
POSTERIOR
UPPER LOBE 1 Apical 2 Anterior 3 Axillary + Paravertebral
MIDDLE LOBE 4 Anterior 5 Axillary
LOWER LOBE 7 Apical 8 Paravertebral 9 Posterolateral 10 Anterolateral 11 Mesial 12 Sub-Apical
Striding lines show main branches from A. bronchi passing into their own segments
Broken lines show branch passing beneath other segments towards their own
ASSEMBLED FROM KRAMER & GLASS.
FROM THE THROAT PATHOLOGICAL & X RAY DEPTS AUCKLAND HOSP

FIGURE I.

FIGURE II.

Examination of the Postero-Anterior Radiograph.

Right Lung.—Our material showed the carina at the level of the body of the sixth dorsal vertebræ. The orifices and distributions of the main bronchi in the right lung are projected on the film as follows:

Upper lobe (Figures V and VII). The opening of the bronchus of the upper lobe lies one centimetre below the level of the carina, about two and a half centimetres from the mid-line. Its vestibule extends laterally for one centimetre.

1. The paravertebral bronchus has a branch directed towards the apex and a lateral branch running from the vestibule towards the outer end of the subclavicular area overlying the first anterior intercostal space. It supplies the area between the third and sixth ribs posteriorly. The signs of incipient tuberculosis are usually found in this area.

2. The branches of the apical bronchus run from the upper lobe bronchus towards the apex, between the spine and the paravertebral bronchus. They supply the area above and just below the first rib.

3. The anterior bronchus runs downwards and outwards from the vestibule towards the centre part of the lung. It supplies the area between the second and fourth ribs anteriorly.

4. The axillary bronchus (Figure VII) runs directly laterally from the junction of the anterior bronchus and the vestibule, to serve the axillary portion of the upper lobe. The lateral branch of the paravertebral bronchus helps in the supply of this area.

Middle lobe (Figure VIII). The orifice of the middle lobe bronchus is three centimetres lower than that of the upper lobe and overlies the vertebral end of the eighth rib three centimetres from the mid-line. It runs downwards and outwards for two centimetres. From this level the lateral branch goes outwards to serve a triangle in the upper and outer quadrant of the lower half of the lung field between the fourth and sixth ribs anteriorly. The anterior branch courses downwards parallel to, and two and a half centimetres from, the right border of the heart to supply the inner half of the lobe between the fourth and sixth ribs anteriorly.

Lower lobe. 1. The apical bronchus (Figure X) of the lower lobe leaves the stem at the same level as the middle lobe bronchus. From this point its branches radiate: (i) Vertically to the level of the sixth rib posteriorly, supplying the inner half of the area bounded by the posterior portions of the sixth and eighth ribs. In our material the apex of the lower lobe was level with the carina and single filling of the apical bronchus did not reach above the level of the sixth rib posteriorly. Radiographs published to illustrate lesions affecting the apex of the lower lobe also show it limited by this level. For these reasons we think it misleading to apply the usual anatomical text-book teaching concerning the level of this apex (fourth dorsal vertebra) to radiographs taken with the subject in the routine erect position. (ii) Laterally across the eighth rib to supply the middle thirds of the intercostal spaces above and below it. (iii) Downwards with lateral and mesial subdivisions supplying the inner half of the eighth intercostal space posteriorly and part of the adjoining ninth. (iv) Mesially from the vertical and downward branches to the inner aspect of the apex of the lobe.

2. The mesial bronchus (Figure XII) emerges from the inner aspect of the main stem where it overlies the inferior margin of the vertebral end of the eighth rib, about three centimetres from the mid-line. The main branch runs downwards over the vertebral ends of the ninth and tenth ribs to supply an elongated oval area in the cardio-phrenic angle (overlying the heart and/or diaphragm) opposite the tenth dorsal vertebra. This bronchus cannot be ignored, as some authors suggest. Films have been used to portray mediastinal abscesses and encysted empyemata when they were characteristic of lesions in this broncho-pulmonary segment. This bronchus is very accessible to a suction tube.

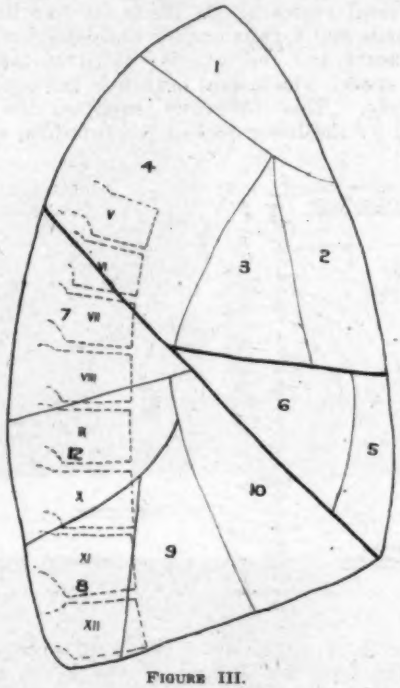

FIGURE III.

3. The orifice of the antero-lateral bronchus (Figure XVI) is usually projected on to the upper border of the vertebral end of the ninth rib, about five centimetres from the mid-line. Its lateral branch runs along this margin of the rib towards the chest wall. The anterior branch is directed into the costo-phrenic angle. This bronchus supplies the triangle bounded by the ninth rib, where it forms the lateral boundary of the chest and the outer third of the dome of the diaphragm. It is common to find this area not filled with lipiodol in many bronchograms of the lower lobe.

4. The subapical bronchus (bronchi) (Figure XIV) arises at varying levels between the vertebral ends of the eighth and ninth ribs, four to five centimetres from the mid-line. Its branches are distributed to an area in the inner half of the lung field in the eighth and ninth posterior intercostal spaces.

5. The postero-lateral bronchus (Figure VIII) runs from below the vertebral end of the ninth rib, six centimetres from the mid-line, downwards to the middle third of the dome of the diaphragm, overlying which its lowest subdivisions are visible. It supplies the middle third of the base of the lung.

6. The paravertebral bronchus (Figure VIII) arises at the same level as the postero-lateral and extends over the inner third of the dome of the diaphragm, overlying which its terminal divisions are seen. It supplies the inner third of the base of the lung.

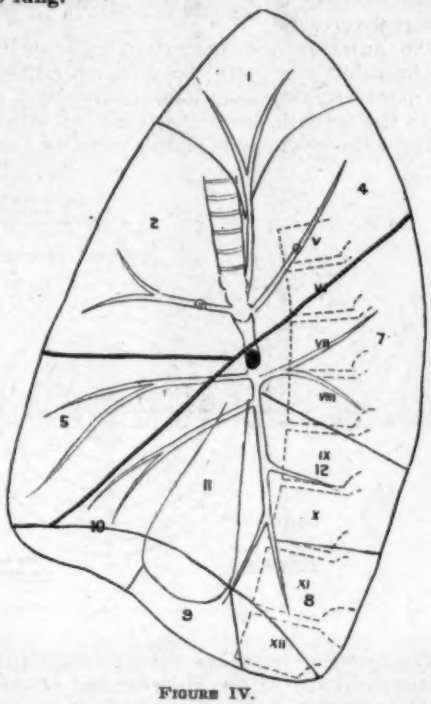

FIGURE IV.

Examination of the Lateral Radiograph.

As the postero-anterior film projects on one plane broncho-pulmonary segments that are wholly or in part superimposed (Figure VIII), the data afforded by an inspection of a lateral film (Figure IX) is an absolute necessity for the correct assessment for their distribution.

It is assumed that the landmarks of the thoracic cage and the disposition of its contents in this projection are known. The lower end of the trachea is identified at the level of the sixth dorsal vertebra. Below this and opposite the seventh dorsal vertebra is an oblong radiolucency of uneven density. Below this area, level with the upper margin of the eighth vertebra and overlying the line of the main inter-lobar fissure where it crosses the sixth rib in the mid-axillary line, is a radiolucent ovoid of deep density. It serves as a reliable guide to the level of origin of the bronchus of the middle lobe and the apical bronchus of the lower lobe. It represents the distal half of the left primary bronchus projected axially.

The two radiolucent ovals are on an area representing the right and left bronchi superimposed. The upper registers the predominance of the right upper lobe opening or vestibule, and the more dense lower, the lower end of the left primary bronchus and the opening or vestibule of the left upper lobe.

The term primary bronchus designates that portion of the bronchial stem from the bifurcation to the opening of the upper lobe.

Upper lobe (Figure VI). 1. The paravertebral bronchus extends backwards and upwards to supply the area of lung overlying the third, fourth and fifth dorsal vertebræ.

2. The anterior and posterior branches of the apical bronchus run vertically from near the origin of the paravertebral bronchus, at the level of the sixth to the seventh dorsal vertebra, to supply the lung above the level of the eighth vertebra.

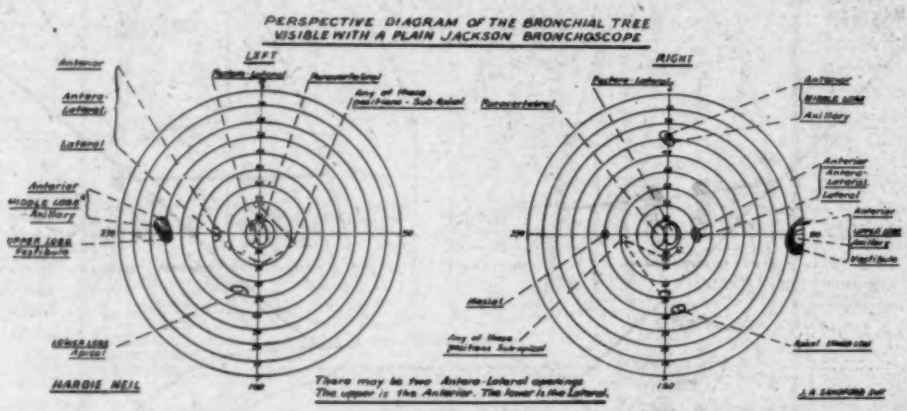

FIGURE XXI.

3. The anterior bronchus runs directly forwards from the vestibule to the anterior end of the third rib. It is distributed in a zone three centimetres wide behind the sternum, between the second and fourth ribs.

4. The axillary bronchus supplies rather more than the middle third of the lobe in this projection, limited above by the third rib and below by the interlobar fissure. The upper and posterior part of this area is served by the lateral branch of the paravertebral bronchus.

Middle lobe (Figure IX). 1. The axillary branch leaves the anterior aspect of the main stem at the level of the lower radiolucent ovoid (seventh to eighth dorsal vertebra) and runs across the upper part of the heart shadow. The first half of its course is directly forwards, then it curves downwards to end in the anterior fourth intercostal space.

2. The anterior branch runs downwards across the middle of the heart shadow, ending near the mid-point of its lower border.

Lower lobe. 1. The apical bronchus (Figures IX and XI) runs backwards from the posterior aspect of the stem at the level of the upper margin of the eighth dorsal vertebra to supply a triangular area of lung overlying the sixth, seventh and eighth dorsal vertebral bodies. Its consistent fan-shape recalls its embryological individuality.

2. The mesial bronchus (Figure XIII) emerges from the anterior aspect of the stem opposite the eighth dorsal vertebra. After a downwards course it supplies an oval area in the middle third of the retro-cardiac space.

3. The antero-lateral bronchus (Figure XVII) arises about the level of the upper margin of the tenth dorsal vertebra. It sends its two branches downwards and forwards over the posterior border of the heart and the anterior third of the retro-cardiac space. The lateral branch is the one placed posteriorly. This bronchus supplies the angle bounded by the lower end of the interlobe and the anterior third of the dome of the diaphragm overlying the posterior border of the heart and the anterior third of the retro-cardiac space.

The upper subapical bronchus or bronchi (Figure XV) arise from the posterior aspect of the stem, between the apical and paravertebral bronchi. They are distributed over the ninth and tenth vertebral bodies.

The postero-lateral bronchus (Figure IX) arises at the level of the tenth dorsal vertebra and runs downwards to supply the posterior third of the retro-cardiac space, below which its branches overlie the diaphragm.

The paravertebral bronchus (Figures IX and XIX) runs downwards and backwards diagonally across the body of the eleventh dorsal vertebra to supply the area of lung in the posterior costophrenic sulcus.

Left Lung (Figures VIII and IX).—Allowing for the lower origin of the vestibule of the upper and middle lobe bronchi and the absence of a mesial bronchus, the descriptions of the radiographs of the right lung can be readily modified and applied to the left.

ILLUSTRATIONS TO THE ARTICLE BY Dr. J. HARDIE NEIL, Dr. W. GILMOUR AND Dr. F. J. GWYNNE.

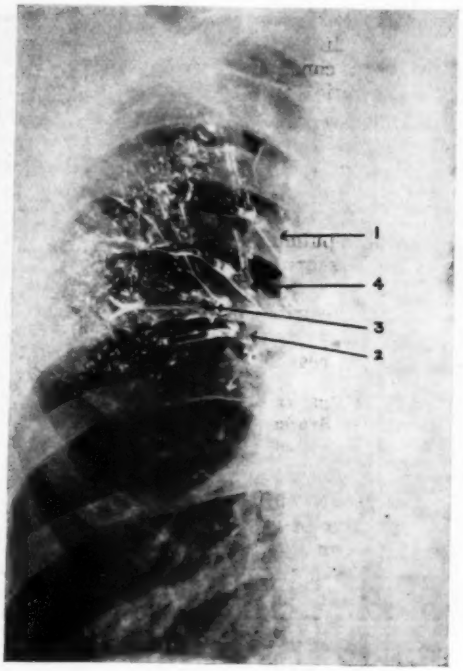

Figure V.

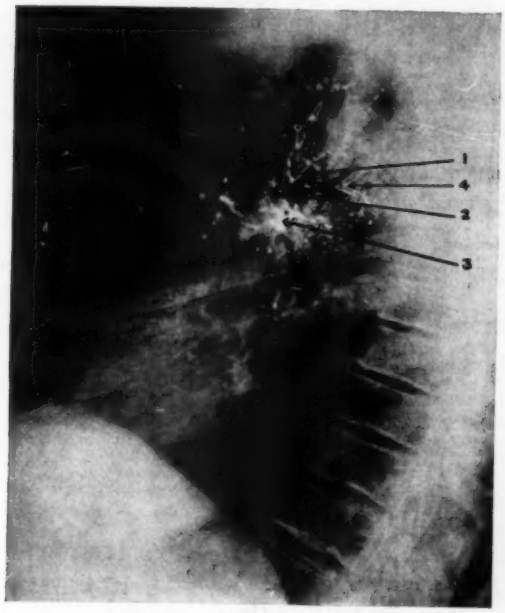

Figure VI.

Figure VII.

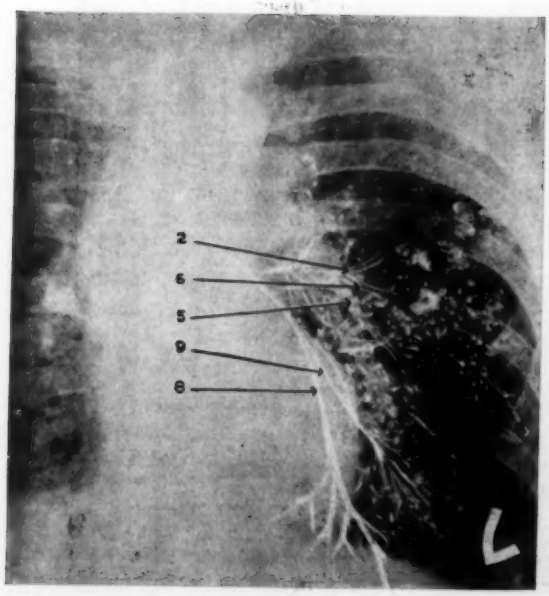

Figure VIII.

ILLUSTRATIONS TO THE ARTICLE BY Dr. J. HARDIE NEIL, Dr. W. GILMOUR AND Dr. F. J. GWYNNE.

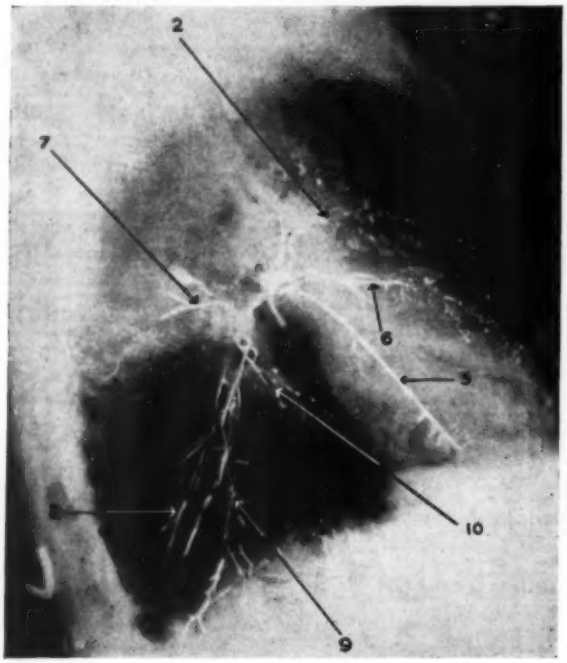

FIGURE IX.

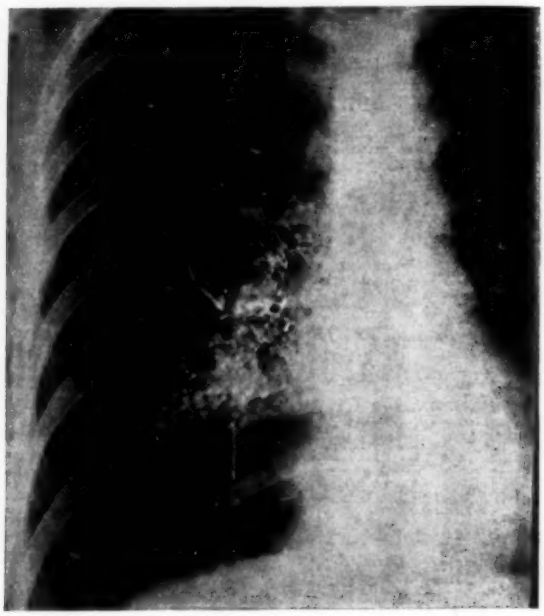

FIGURE X.

FIGURE XI.

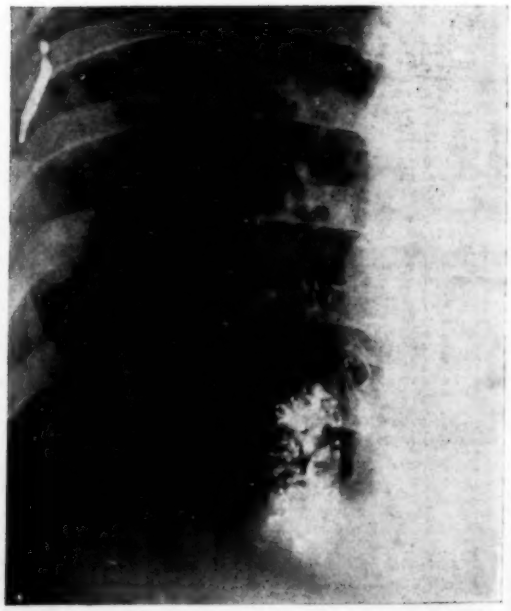

FIGURE XII.

ILLUSTRATIONS TO THE ARTICLE BY DR. J. HARDIE NEIL, DR. W. GILMOUR AND DR. F. J. GWYNNE.

FIGURE XIII.

FIGURE XIV.

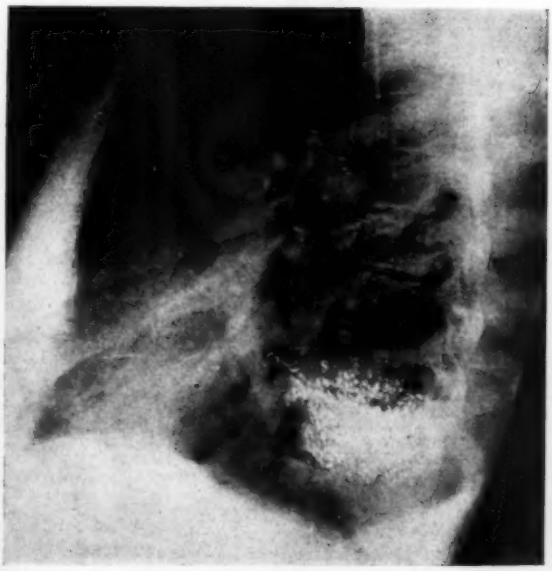

FIGURE XV.

FIGURE XVI.

ILLUSTRATIONS TO THE ARTICLE BY Dr. J. HARDIE NEIL, Dr. W. GILMOUR AND Dr. F. J. GWYNNE.

FIGURE XVII.

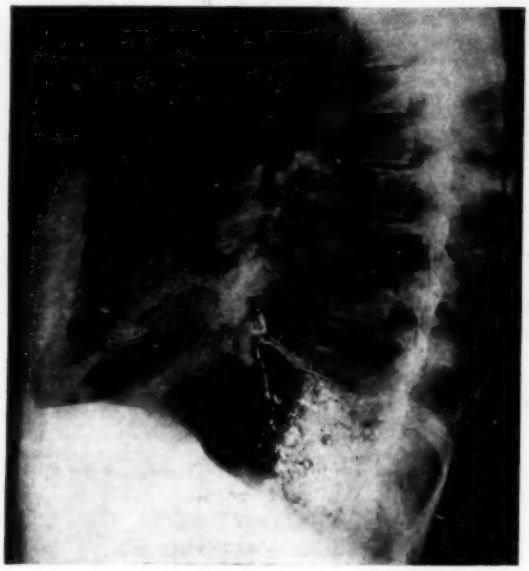

FIGURE XVIII.

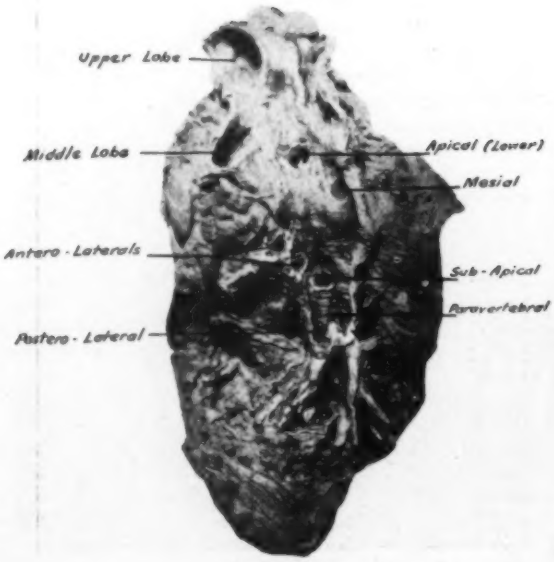

FIGURE XIX.

FIGURE XX.

CONCLUSIONS.

We recognize, with Kramer and Glass, in the lower lobe apical, mesial, antero-lateral, postero-lateral and paravertebral broncho-pulmonary segments. A particular investigation was made of the lesser orifices, previously referred to, on the dorsal and mesial aspects of the lower main stem bronchus. These lie between the apical bronchus and the final bifurcation of the stem into postero-lateral and paravertebral bronchi. We have named them subapical.

The posterior region of the lower lobe is supplied, according to all previous publications to which we have had access, by the apical bronchus in the upper portion and the paravertebral in the lower. We are convinced that an intermediate separate segment exists and can be demonstrated, and that it is the site of localized pathological change, as shown by radiology and bronchoscopy. It is an anatomical gap in the distribution between the apical and paravertebral bronchi in all illustrations we have seen. We have found that it is supplied by these subapical bronchi. This has been shown by inflation in specimens and by lipiodol fillings in patients.

Homologues of the subapical can be seen in the mammalia on the dorsal, lateral, ventral and mesial aspects. In the human being they are generally confined to the dorsal, lateral or mesial area; but we have seen specimens in the left lung in which its orifice was on the ventral aspect, below or caudal to the level of the apical.

If the distribution of the bronchi as outlined above is applied to satisfactorily exposed radiographs (especially stereoscopic), it will be found that they correspond more or less accurately with the lung markings. By using these findings we are able to survey each broncho-pulmonary segment *seriatim* during the routine examination of our plain films. We recommend the procedure, as it brings order into the disposition of these shadows, which many of us have been inclined to regard as defiant of rapid and practical analysis.

With the exception of certain cases of urgent dyspnœa of mechanical origin, deviations from the rule that a radiological examination should precede bronchoscopy will lead eventually to disaster.

The surgical and medical treatment of certain lung conditions should be based on data which contain the reciprocal report of the radiologist and bronchoscopist.

Lung abscess affects one segment primarily. This may be identified with the bronchoscope before pus is present in the tree. As the disease progresses, it makes its way to the surface, where pleural adhesions form. Kramer and Glass emphasize the surgical importance of having the involved segment delineated and definitely localized, so that the dire results of opening normal pleura and approaching the abscess through healthy lung will be avoided.

When bronchiectasis is suspected, bronchoscopy is advised to determine the location of the disease, for aspiration of the involved area and for instillation of a minimal quantity of lipiodol so that the radiographs will give clear, unobstructed delineation of the condition of the bronchi in the affected broncho-pulmonary segment or segments.

"Blind" filling of the bronchi with lipiodol minimizes the value of the radiographic examination. In such cases the radiologist should specify in his report the broncho-pulmonary segments containing lipiodol and those deficient in the contrast medium.

The clinician can help his visualization of the evolution of these and certain other lung diseases by being conversant with the orientation of the broncho-pulmonary segments.

ACKNOWLEDGEMENTS.

Our thanks are offered to Dr. Wallace Main, radiologist, Auckland Hospital, for placing at our disposal the facilities of his department, and to his assistants for their active cooperation.

Mr. J. A. Sandford, who made the line drawings, thinks he is only making a gesture of appreciation for the removal of a staple that had been embedded in his left postero-lateral bronchus for thirty-four years. The omission of radiological examination was responsible for a large proportion of this period.

In conclusion, we have to thank Mr. E. Bilkey, technician of the Auckland Hospital, for making the models of the lung. His ingenuity in the making of bronchoscopic apparatus has been invaluable to us.

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H. P. Nelson: "Postural Drainage of the Lungs", *The British Medical Journal*, August 11, 1934, page 251.

Sylvan E. Mooltan: "A Simple Apparatus for Fixation of Lungs in the Inflated State", *Archives of Pathology*, Volume XX, 1935, page 77.

DESCRIPTIONS OF RADIOGRAPHS.

Retouching of the films has been done, as films of single fillings with small quantities of lipiodol lose much of their detail in reduction.

The numerals on Figures V, VI, VIII and IX correspond with those in the diagrams (Figures I, II, III and IV).

Figure V.—Postero-anterior view of upper lobe bronchi.

Figure VI.—Lateral view of upper lobe bronchi.

Figure VII.—Postero-anterior view of upper lobe, axillary branch filled, paravertebral and anterior partially filled. The lipiodol in the costo-phrenic angle is the residue of a previous filling of the antero-lateral bronchus of the lower lobe.

Figure VIII.—Postero-anterior view of left lung. Partial filling of anterior bronchus of upper lobe. Filling of both bronchi of middle lobe. Filling of paravertebral and postero-lateral bronchi of lower lobe. The unfilled area in and above the costo-phrenic angle is a "negative" filling of the area supplied by the antero-lateral bronchus.

Figure IX.—Lateral film of Figure VIII. In addition to bronchi seen in Figure VIII, the apical and antero-lateral bronchi of the lower lobe are seen filled in part of their extent. Between the apical and paravertebral bronchi a "negative" filling of the subapical broncho-pulmonary segment is noteworthy.

Figure X.—Postero-anterior view. Single filling of apical broncho-pulmonary segment of lower lobe.

Figure XI.—Lateral film of Figure X.

Figure XII.—Postero-anterior view. Single filling of mesial broncho-pulmonary segment.

Figure XIII.—Lateral film of Figure XII.

Figure XIV.—Postero-anterior view. Single filling of the subapical broncho-pulmonary segment.

Figure XV.—Lateral film of Figure XIV.

Figure XVI.—Postero-anterior view. Single filling of anterior portion of the antero-lateral broncho-pulmonary segment of the lower lobe and filling of the bronchus of the lateral portion of this segment.

Figure XVII.—Lateral film of Figure XVI.

Figure XVIII.—Lateral film of paravertebral broncho-pulmonary segment with a subapical bronchus above it.

Figure XIX.—The right bronchial tree incised and retracted to show the bronchial openings.

Figure XX.—The left bronchial tree incised and retracted to show the bronchial openings.

A NOTE ON THE LANGE TEST AND ON THE PREPARATION OF COLLOIDAL GOLD.

By JAMES SUTHERLAND,
Bacteriologist.

(From the Baker Medical Research Institute, Alfred Hospital, Melbourne.)

SINCE its introduction by Lange[1] in 1912, the colloidal gold test on cerebro-spinal fluid has become generally recognised as a desirable diagnostic aid, particularly in cases of neuro-syphilis. Some neurologists consider that this test should be included in all examinations of clear fluids and that a negative result to a test may be as helpful in diagnosis as a positive reaction. The Lange test, however, should be interpreted only in the light of essential complementary investigations on the same sample of cerebro-spinal fluid, namely, type and count of cells present, determination of total protein, globulin and chlorides, and the Wassermann test. The amount of fluid available may limit the range of tests that may be done, but the Lange test, which requires only about 0·2 cubic centimetre of fluid, may usually be included. It should be the aim of the laboratory worker to obtain the greatest possible amount of information from the fluid available, as lumbar puncture is not without discomfort and risk to the patient, and, on the other hand, takes up valuable time of the medical and nursing staffs. The necessity for repeated punctures should, therefore, be avoided as far as possible, except when it is necessary to follow the patient's condition.

Unfortunately the Lange test has come into a certain amount of disfavour, owing apparently to difficulties experienced by many workers in preparing and using the colloidal gold. In some laboratories the test has been abandoned or replaced by tests in which are used other colloids, such as mastic, gamboge, Berlin blue *et cetera*. The writer has tried colloidal carbon (Looney and Stratton,[2] 1934), but found that it had two disadvantages: first, different batches were not equally sensitive, and secondly, the sensitivity altered on keeping. As pointed out by Greenfield and Carmichael,[3] these substitute methods "have various objections and are not nearly so sensitive as the colloidal gold reaction". Moreover, clinicians expect the Lange test, around which considerable literature has now accumulated.

The purpose of the present note is to bring to notice a method described by Patterson[4] (1931) and Williams[5] (1935) which the writer has found simple and satisfactory. Gold sols, prepared by this method, have now been in routine use in this laboratory for one year, during which time over 300 specimens of fluid have been tested.

Patterson claimed for this method that while its "steps are the simplest and its reagents readily available, it yields gold sols with a precision and certainty unequalled by any of the usual methods, including that of Mellanby and Anwyl Davies[6] (1923), which it follows in using oxalate reduction".

The latter workers prepared a sol of neutral reaction by using neutral reagents and freshly redistilled water. They demonstrated the importance of reaction (pH) on the sensitivity of the gold sol, a slight amount of acid added to the neutral sol increasing its sensitivity so that normal fluids might give positive reactions; while, on the other hand, the addition of a small amount of alkali might give a negative result with a paretic fluid, that is, a cerebro-spinal fluid giving a paretic zone reaction in the Lange test. They therefore advocated a neutral sol, the sensitivity of which would accordingly be standard. This sol, however, in this highly sensitive state, was readily affected by slight contamination from the atmosphere *et cetera*, both in preparation and in storing, and therefore was not suitable for prolonged storing before use.

It should be pointed out here that the sensitivity of a gold sol depends not only upon its pH, but also on the size of the colloidal gold particles. Both these factors are considered automatically when sensitivity is standardized (as described later) under Lange test conditions.

Patterson showed that equally satisfactory gold sols could be prepared in the presence of a small amount of alkali and that, on account of their lower sensitivity, these sols were quite stable both in preparation and storage. For use in the Lange test this stable gold sol could be adjusted to standard sensitivity by the addition of a small amount of acid. Furthermore, Patterson mixed all the reagents for the preparation of gold sol in the cold, and heated the mixture gradually to boiling point, instead of using the usual method of adding one of the reagents when the bulk fluid is already hot. This tends to more gradual reactions and better control in preparation of the gold sol. Williams confirmed the claims made by Patterson and introduced slight modifications in technique, some of which have been incorporated in the method as described herein.

Preparation of Stock Gold Sol.

Reagents.

1. Distilled water, freshly redistilled, for use in all solutions and in final rinsing of glassware.

2. Gold chloride, 1% solution, one gramme to one hundred cubic centimetres of water. Merck's *"Aurum Chloratum Cryst."*, list number 1,582. This is obtained in one-gramme vials. The 1% solution is acid to litmus. (Note: Paterson used the double salt, $AuCl_3 - NaCl2H_2O$, and Williams recommended the acid salt, $AuCl_3HCl$. We have used both successfully.)

3. Potassium oxalate, 1% solution, freshly prepared. Merck's neutral guaranteed reagent, list number 5,073.

4. Potassium hydroxide, N/50, one litre. Merck's guaranteed reagent, list number 5,024.

5. Hydrochloric acid, N/50, one litre, c.p. HCl.

6. Sodium chloride, c.p. 0·4%, one litre.

7. Glycerine (neutral). Merck's bi-distilled, list number 4,093 or 4,094.

(List numbers above refer to Merck's 1936 catalogue.)

Glassware.

For exclusive use in this work it is necessary to have the following supply of glassware:

Florence flasks: 3 three-litre (2 for preparing gold sol, 1 for distilled water); 1 five-litre for storing stable gold sol; 4 one-litre (1 for N/50 HCl, 1 for N/50 KOH, 1 for 0·4% NaCl, 1 for use in adjusting stable sol for use in the Lange test); 8 one hundred cubic centimetre (1 for 1% gold chloride, 1 for 1% potassium oxalate, 6 for supplementary titration).

Test-tubes: Five inches by five-eighths of an inch, say two gross. All above of Jena or other resistance glass.

Measuring pipettes: Ten cubic centimetre and one cubic centimetre graduated pipettes.

Measuring cylinders: One 1,000 cubic centimetres, one 100 cubic centimetres.

Pipettes and cylinders, which are only used for short periods in measuring the fluids, may be of ordinary glass.

Cleaning of Glassware.

All glassware must be made chemically clean and dry, but not necessarily sterile. Tubes and flasks *et cetera* used for gold solutions or sols should be treated with *aqua regia* as part of the cleaning process. After several rinsings in clean water and a final rinse in distilled water the glassware is allowed to drain and dry in the air without heating.

Preliminary Titration: To Determine the Amount of Alkali Necessary in Preparing the Gold Sol.

In nine test-tubes place varying amounts of N/50 KOH, as follows:

Tube No.	1	2	3	4	5	6	7	8	9
Alkali, c.c.	0	0·15	0·20	0·25	0·30	0·35	0·40	0·45	0·50

Now add to each tube 5 cubic centimetres of the following mixture of gold sol reagents: distilled water, 50 cubic centimetres; 1% potassium oxalate, 0·5 cubic centimetre; 1% gold chloride, 0·5 cubic centimetre.

Shake gently to mix the contents of the above tubes and then place the tubes in a beaker containing sufficient water to come up to the level of the fluid in the tubes. Place the beaker over a Bunsen flame on a plain wire gauze mat (without asbestos centre) and heat until the water has boiled for two minutes. Remove the tubes and place in order in a test-tube rack for examination. Note the tube showing a bright red colour. With our reagents this tube is usually number 4, so that as 0·25 cubic centimetre is required for 5·0 cubic centimetres of sol, for 1,000 cubic centimetres we require 50 cubic centimetres of N/50 KOH. Should two tubes, say 4 and 5, give the required end point, the one containing the smaller amount of alkali is chosen as correct. Other tubes in the series will be dark red, purple, blue or colourless.

Preparation of Stable Stock Gold Sol.

Williams recommends the preparation of one-litre batches of stable sol, as many as are required, and then mixing them into one pooled stock. We have prepared batches of various sizes, from as small as 100 cubic centimetres up to three litres, in precisely the same manner as for one-litre batches, observing, however, a constant rate of heating.

For a one-litre batch of stock gold sol, measure into a three-litre flask distilled water, 1,000 cubic centimetres; 1% gold chloide, 10 cubic centimetres; 1% potassium oxalate, 10 cubic centimetres; and the amount of N/50 KOH indicated by the preliminary titration, say 50 cubic centimetres.

Now heat this mixture in the flask over a Bunsen flame protected with a plain wire gauze mat, so that boiling occurs in about ten to twelve minutes. At first the fluid is practically colourless in the flask, then a blue colour develops, which changes gradually to purple and later to a deep red. Finally, just before boiling, a sudden lightening of the red colour takes place, indicating the completion of the reaction. Heating should be continued till actual boiling occurs, when the flask is removed from the flame. If the lightening of the red colour does not occur, something is wrong with the measurements or reagents. The period of heating is apparently also important and should be adjusted so that the final change occurs just before boiling (usually ten to twelve minutes). Prepare as many litre lots as are required and then mix them in one bulk container and store in a cool dark cupboard, protected from fumes and dust by suitable stopper or cap.

Quantities of the stable sol are decanted from the bulk container as required for the Lange tests (once a week in this laboratory). At first we prepared pooled batches of eight to ten litres at a time, but found this unnecessary and inconvenient. The 1% gold chloride keeps for months in a stoppered flask stored in a cupboard, so that only fresh 1% potassium oxalate solution and freshly distilled water are necessary when another stock of stable sol is to be prepared. If the same stocks of dry

reagents are used throughout, the original preliminary titration holds good, in our experience, for all succeeding batches. We have found some batches of stable sol fully potent six or more months after preparation, but occasionally a batch, when nearly exhausted, has shown signs of becoming stale. Consequently we now make smaller batches (three by one litres), the stock life of which is limited to three months. Probably by less handling of the bulk stock its useful life might be extended considerably, but it apparently cannot be expected to keep indefinitely under practical conditions.

Supplementary Titration: To Determine the Amount of Acid Required to Adjust the Stable Stock Sol to Standard Sensitivity for Use in the Lange Test.

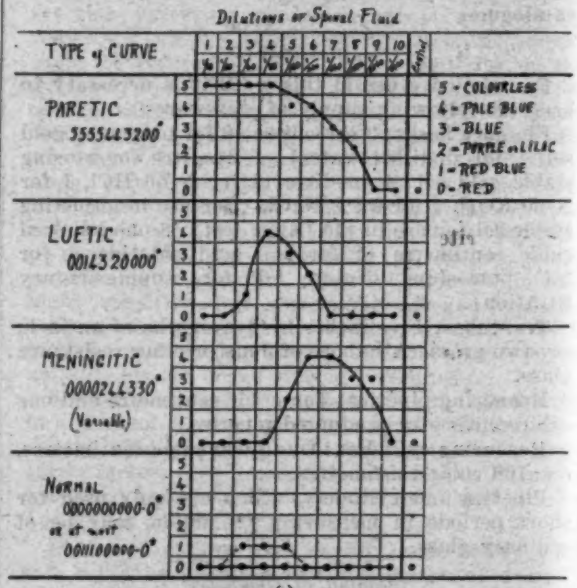
Several methods have been proposed for determining the sensitivity of gold sols for use in the Lange test, but usually the ultimate check is made on a known paretic cerebro-spinal fluid. Patterson, however, used a weak solution of his own blood, and Williams advocated the use of a solution of edestin as standard for the supplementary titration on Patterson's stock gold sol. The present writer found edestin unsatisfactory and decided to use instead a paretic cerebro-spinal fluid. A fluid was selected which was found to give a moderate paretic zone reaction, say 555421000-0, while normals gave not more than 0011100000-0 on the same sol. To determine the amount of acid required to adjust the stock sol to standard sensitivity, it is simply a matter of setting up a series of Lange tests, using the paretic fluid against portions of the stock sol to which varying amounts of acid have been added. For this purpose we prepare six 50 cubic centimetre lots of sol, which are adjusted by the addition of N/50 HCl as follows: 0·8 cubic centimetre, 0·9 cubic centimetre, 1·0 cubic centimetre, 1·2 cubic centimetres, 1·4 cubic centimetres and 1·6 cubic centimetres respectively. Usually we find that 1·0 cubic centimetre of N/50 hydrochloric acid is required for 50 cubic centimetres of stock sol. As in the case of the preliminary titration, it may not be necessary to do supplementary titrations on subsequent batches of stock sol prepared from the same reagents.

Note: Once acid has been added to the stable sol, it is no longer suitable for prolonged storage. We adjust the stable sol for use on the same day. This is a simple matter, as the amount of acid to be added remains constant during the stock life of the stable sol.

The Technique of the Lange Test.

Set out eleven test-tubes in a rack and in all except the left-hand tube (that is, number 1) place 1·0 cubic centimetre of 0·4% saline solution. In tube number 1 place 1·6 cubic centimetres of 0·4% saline and 0·4 cubic centimetre of glycerinated spinal fluid to be tested. Mix by gentle shaking and transfer 1·0 cubic centimetre from tube 1 to tube 2. Mix the contents of tube 2 and transfer 1·0 cubic centimetre from tube 2 to tube 3, and so on till the tenth tube, when 1·0 cubic centimetre from tube 10 is discarded. Tube 11 is the saline control and receives no spinal fluid. Thus a series of dilutions of from 1/10 to 1/5120 is prepared, 1·0 cubic centimetre of each respectively. To each tube now add 5·0 cubic centimetre of the adjusted gold sol, and after the tubes have stood twenty-four hours on the bench, read the reactions produced.

Full precipitation of the gold and colourless fluid is designated 5, partial precipitation and pale blue colour = 4, blue = 3, purple or lilac = 2, red-blue = 1, no change = 0. A reading of 5555421000-0 indicates, therefore, that in tubes 1 to 4 the gold was precipitated and the fluid colourless, tube 5 was pale blue colour, tube 6 was lilac, tube 7 slight colour change of red-blue tint, and the other tubes no colour change. Usually the results are given in figures, but they may also be given graphically as curves. Examples are given in Graph I.



GRAPH I.

If economy of gold sol is necessary, it is perfectly feasible to use half quantities in the Lange test and supplementary titration. Also if the Lange test is done on a fluid soon after collection, that is, before possible growth of bacteria in it, glycerine need not be added to the fluid, in which case, instead of 0·4 cubic centimetre of fluid in tube 1, we would use 0·2 cubic centimetre and 1·8 cubic centimetres of saline.

Glycerine as a Preservative in Spinal Fluid for the Lange Test.

Kreidler and Small[7] (1931) showed that cerebro-spinal fluid can be preserved by mixing it with equal parts of neutral glycerine. Glycerine, being inert colloidally, does not affect the Lange test, but prevents growth of bacteria. Unless the test is to be done on the day on which the fluid is obtained from the patient, we now preserve all fluids for the

Lange tests. A small sample, after being mixed with an equal volume of glycerine, is stored in the ice-chest until the following Tuesday, when the Lange tests are done. This fits in with the routine Wassermann tests, which are done on Wednesday, and thus both reports are available on Wednesday of each week. Preserved paretic fluids, used for standardizing new batches of sol and for controls in the weekly Lange tests, have been found fully active after several months, and this method should be useful in sending fluids for the Lange test through the post if necessary. In the latter case the complementary tests would have to be done by the sender of the fluid (cells, globulin *et cetera*).

Conclusions.

Stable colloidal gold may be prepared simply and consistently, and adjusted, when required for Lange tests, to standard sensitivity.

The stock gold sol might be prepared and distributed by local manufacturing chemists for the convenience of the smaller laboratories, and preserved paretic fluids of known reactivity might be made available where necessary by the workers in the larger hospital laboratories of the capital cities of Australia.

Acknowledgements.

The writer wishes to thank Dr. L. B. Cox and Dr. A. R. Buchanan, of the Alfred Hospital, for their advice and interest in the Lange test, and also Dr. Farran-Ridge, of Mont Park Mental Hospital, Victoria, who kindly made available cerebro-spinal fluid from patients with general paralysis of the insane.

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THE LANGE COLLOIDAL GOLD REACTION AS A ROUTINE TEST: A PRELIMINARY NOTE ON THE RESULTS.

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IT is now twelve months since the Lange colloidal gold test was made a routine test on every specimen of cerebro-spinal fluid sent to the laboratory, and it has been felt that a preliminary report on the results of the work during that period would not be out of place, particularly as an article on the method and technique of production of the colloidal sol used in the Baker Institute for this work has recently been prepared.

The test itself is very interesting in that it was discovered quite by accident. Zsigmondy had produced a colloidal gold sol and had found that it was precipitated by electrolytes, but that egg albumen solution protected it against such precipitation. Lange, in 1912, repeated his work, and in the course of experimental work tried the effect of the highly albuminous cerebro-spinal fluid from a patient suffering from general paralysis of the insane. To his surprise the sol was precipitated. This was the starting point of further investigation, as a result of which he discovered that while the cerebro-spinal fluid from patients suffering from general paralysis of the insane and, to a less extent, from those suffering from other forms of syphilis of the nervous system and from meningitis precipitated the gold sol, normal cerebro-spinal fluid had no such effect, and from this work the test as we know it developed. By working in progressive dilutions of cerebro-spinal fluid, he found the three zone curves which are now so well known.

The test was at first thought to be specific for syphilis, and was included, with Nonne's four tests, as the fifth test for syphilis of the nervous system; but this view was soon proved erroneous, for though the test is of extreme value in the differentiation of the various forms of syphilis of the nervous system, certain non-syphilitic conditions have been shown to produce curves which are frankly paretic or luetic in type.

At this point it is as well to emphasize strongly the fact that the Lange test alone is of practically no value in diagnosis; it must be considered in conjunction with all the other findings on examination of the cerebro-spinal fluid and with the clinical condition of the patient before the true significance of the reaction becomes manifest.

The introduction of the Lange test as a routine measure gave rise to many technical difficulties; very special precautions to ensure absolute purity of the water and reagents used were necessary before a satisfactory sol could be produced, and even with these precautions, on occasions the sol failed. In addition, the sol, as a rule, would not keep and had to be made fresh for each series of tests, and further, the degree of sensitivity in different batches of sol was not constant and could not be standardized, so that the results obtained with one batch could not be accurately compared with those obtained with another batch.

Work was undertaken in the Baker Institute to attempt to overcome these difficulties, and it soon became apparent that, by following in the main a modified technique worked out by Patterson, of London, and elaborated by Williams, of America, it was not difficult to obtain a stable and accurate

gold sol, which was uniformly sensitive and therefore capable of producing comparable results. The direct result of this work has been the introduction of the colloidal gold test as a routine test on every specimen of cerebro-spinal fluid sent for examination in this hospital.

As I have previously pointed out, the Lange test alone is of no diagnostic value, and it is therefore essential that in addition to this test a routine full examination of the fluid must, at the same time, be carried out, in order that the maximum of diagnostic information may be obtained from each specimen of cerebro-spinal fluid.

Lumbar puncture is not a procedure to be undertaken without due consideration; it is not without a degree of discomfort and an element of danger to the patient, and it involves a fair amount of time and trouble for the doctor and nurse in obtaining the fluid. Therefore repeated punctures, except when they are necessary as an indication of the patient's progress or for therapeutic reasons, are to be strongly deprecated. To have to repeat a puncture because in the first instance all the available information was not obtained from the cerebro-spinal fluid by complete examination is inexcusable, not only for the reasons already given, but also because valuable time is wasted in waiting for the complete results. Moreover, at times the fluid from the repeated puncture may be definitely misleading because of changes occurring in it as the result of trauma produced at the first puncture.

For the sake of completeness the scheme of examination of the cerebro-spinal fluid in use at the Alfred Hospital is given herewith; it has been found quite satisfactory and gives the necessary full information desired. The amount of fluid required in each instance is as follows:

1. *Clear Fluid.*	C.cm.	2. *Turbid Fluid or Suspect Meningitis.*	C.cm.
Cells	0·5	Cells	0·5
Total protein	2·0	Total protein	2·0
Globulin	0·5	Globulin	0·5
Chloride	2·0	Smear	0·5
Lange test	1·0	Culture	1·0
Wassermann test	1·0	Chloride	2·0
Refractive index	0·5	Lange test	1·0

It is apparent that the maximum amount of fluid required for this scheme is 7·5 cubic centimetres; if modifications are made in the technique of some of the tests a smaller quantity will suffice, but five cubic centimetres are the absolute minimum. If less than five cubic centimetres are available, the tests particularly required are specified and the remainder of the fluid is used to the best advantage.

In the enumeration of the cells it is important that the type of cell present should be noted and that tumour cells should be looked for in cases of suspected brain tumour. In this hospital it has been made a routine measure that cells not positively identified are referred to the pathologist for his opinion.

The refractive index is included as a valuable check on the other findings; if any great discrepancy occurs between the estimated and observed refractive index, it usually indicates a distinct rise in urea or sugar. Examinations for an increase in the urea content or a rise in the sugar level of the cerebro-spinal fluid should then be carried out; but the tests are not done as a routine.

During the twelve months in which the Lange test has been done as a routine test, over 300 patients have been investigated. This number is obviously too small to allow of any definite conclusions, but it has been sufficient to record some suggestive results. The majority of the patients yielded curves which lay within the limits of normality, but even these in a number of instances provided valuable negative evidence. Of the patients who have shown a variation from the normal, there are two groups, picked in rather different ways, which are of sufficient interest to merit consideration.

The patients in the first group show a paretic zone reaction. This curve, as the name implies, is characteristically found in patients suffering from general paralysis of the insane. It has, however, been observed in cases of disseminated sclerosis, of mongolism and, rarely, of cerebral tumour. In addition, it has been found in certain cases of syphilitic meningomyelitis and of *tabes dorsalis*, but in these conditions it usually tends under treatment to change to the luetic type. The group covers a series of seventeen cases, and the appended list shows that the clinical diagnosis was very varied, and serves to exemplify the fact that the Lange test taken alone is valueless in diagnosis. The distribution of these cases was as follows:

General paralysis of the insane	7
Disseminated sclerosis	2
Septic meningitis	3
Tabes dorsalis	1
Syphilitic meningomyelitis	1
Cerebral degeneration (unknown etiology)	1
Septicæmia (unproved)	1
Syphilis (no signs in central nervous system)	1

Consideration of the separate cases clearly shows the value of the Lange test as a routine measure.

A number of the patients diagnosed as suffering from general paralysis of the insane were not typical. In two (Cases I and II) the clinical findings were indefinite, the mental symptoms were outstanding and the physical signs slight and inconclusive. In view of the dictum that general paralysis of the insane is a physical disease with mental symptoms, the absence of clear physical signs made the diagnosis very uncertain until a full examination of the cerebro-spinal fluid provided the final link in the diagnostic chain. Case III was very interesting. The previous history of malignant disease raised the suspicion that the patient's symptoms were due to metastatic growths, and attention was concentrated on that aspect of the case; it was not until a full examination of the cerebro-spinal fluid had been made that the true diagnosis was revealed. Another case (Case IV) is of unusual interest in that clinically the diagnosis was general paralysis of the insane, but the Wassermann test

gave no reaction on a number of occasions. The Lange test, however, gave a strong paretic reaction, and subsequent autopsy confirmed beyond all doubt the diagnosis of general paralysis of the insane.

The other cases of syphilis of the central nervous system (Cases VIII, IX, X) demonstrate an uncommon but valuable application of the test. Though my own experience is small, I have seen patients whose clinical diagnosis was uncomplicated *tabes dorsalis*, but who showed a treatment-resistant paretic zone reaction, return some years later with unmistakable tabo-paresis. I feel that we have in this test a diagnostic signpost indicating the necessity for malaria-"Tryparsamide" therapy as a prophylactic against the onset at a later date of paretic signs and symptoms which would seem likely to occur were no such treatment instituted. Equally does this hold for those patients who, although they manifest no clinical signs of involvement of the central nervous system, give, together with a persistent paretic zone reaction to the Lange test, a positive reaction to the Wassermann test which is not affected by treatment.

The cases of septic meningitis (Cases XI, XII, XIII) present a peculiar problem. No reference to such an occurrence could be found in the literature. There was no doubt as to the diagnosis, as in each instance the responsible organism was recovered from the cerebro-spinal fluid, and subsequent autopsy provided any necessary confirmation. A suggested explanation is that, as a result of bacterial action, the pH of the cerebro-spinal fluid of these patients is changed towards the acid side, an alteration which would cause an increased sensitivity of the gold sol, particularly in the lower dilutions of cerebro-spinal fluid, and could, therefore, give rise to the unusual type of curve found in these cases.

In cerebral degeneration (Case XV) no explanation can be given. Although there was no evidence of mongolism, the cause may be the same as that giving rise to the paretic reaction in that condition.

One other case (Case XVIII) may be included as a contrast.

The patient was a man suffering from syphilis, who presented marked mental change and few physical signs, and the suspicion was raised that his condition was general paralysis of the insane. The Lange curve, however, was in the luetic zone, which suggested that the condition was one of meningo-vascular syphilis and, therefore, more amenable to treatment. This, however, is not certain, for in a number of cases cerebro-spinal fluid from patients considered by the authorities at the Mental Hospital, Mont Park, to be suffering from general paralysis of the insane has, on investigation, shown luetic zone reactions. In the case cited the patient was discharged at his own risk after two days, and, therefore, the response to treatment could not be ascertained.

The second group of cases was of patients suffering from cerebral tumour. It was hoped that by means of the Lange test further diagnostic information might be obtained, particularly as a survey of the literature showed that the opinion of different writers as to what may be taken as a significant curve varied very greatly, so much so that no conclusive results could be obtained. From the somewhat limited series under review (54 cases) all that can be said is that, while in a fair proportion of cases examined the curve is within normal limits, there are a number in which a change up to lilac (2) occurs, with a maximum in the fifth and sixth tubes. This type of curve has not been paralleled in any other condition and, as greater numbers are examined, may prove of considerable importance in diagnosis. The finding which is almost uniform throughout this series is a moderate increase in total protein (up to 0·08%, occasionally higher) without corresponding increase in the number of cells. So regular has this *dissociation cyto-albuminique* been that, provided loculation and antecedent trauma or hæmorrhage can be excluded, it would appear to be of great pre-operative diagnostic value.

In conclusion, I would again state that the present series of cases is far too small to allow of any dogmatic conclusions, but even at this early stage the value of the Lange test as a routine measure has been quite apparent. As the number of cases investigated increases, by a careful correlation of the results of the test with clinical findings and diagnosis, I feel that some quite definite conclusions will be reached, and some at least of the present difficulties in interpretation will be solved.

Acknowledgements.

I wish to express my thanks to members of the honorary medical staff of the Alfred Hospital for permission to use their cases.

APPENDIX.

CASE I.—M.M., a male, aged fifty-four years, gave a history of one year's failing memory. He was irrational at times, subject to delusions, losing interest in himself and his surroundings. He became clumsy, dropping objects. Just prior to his admission to hospital he became very drowsy.

On examination his speech was thick and almost unintelligible. He had a very slight tremor of the tongue. Examination of the central nervous system revealed no abnormal signs. On examination of the cerebro-spinal fluid the total protein was found to be 0·16%; the globulin test gave a positive result. There were 140 red blood cells and 14 lymphocytes per cubic millimetre. The Lange curve was 5555532211. The cerebro-spinal fluid gave a "++" result to the Wassermann test. The blood gave a "+++" result to the Wassermann test. The diagnosis was general paralysis of the insane.

CASE II.—E.M., a female, aged fifty years, was the wife of the patient in Case I. She gave a history of loss of memory and drowsiness for one week; she was mentally unstable and uncertain. On examination her speech was indistinct and slurred, her tongue was tremulous. No other abnormal signs were discovered in the central nervous system.

On examination of the cerebro-spinal fluid the total protein was 0·1%; the globulin test gave a positive result; two lymphocytes were found in each cubic millimetre of fluid. The Lange test gave the following curve: 5555331000. The Wassermann test gave a "+++" reaction. The blood gave a "++++++" reaction to the Wassermann test. The diagnosis was general paralysis of the insane.

CASE III.—J.G., a female, aged fifty-seven years, gave a history that one year ago she had a carcinoma of the *corpus uteri* treated with radium. Following this she had giddiness, gradually getting worse. Her memory was not good. More recently she had staggering with falling

forward, and also pain in the back, more on the left side. She had occasional vomiting.

On examination her pupils were unequal, the left was larger than the right, they reacted sluggishly to light. The deep reflexes were very active. The plantar reflexes were flexor. No sensory change was detected. The Romberg sign was positive.

On examination of the cerebro-spinal fluid the total protein was 0·15%; the globulin test gave a positive result; the cells found were eleven lymphocytes and one polymorphonuclear cell per cubic millimetre. The curve from the Lange test was 5555222100. The Wassermann test gave a "++±" reaction. The blood gave a "++++±" reaction to the Wassermann test. The diagnosis was general paralysis of the insane.

CASE IV.—J.E. was a male patient. He was in another institution and full clinical notes are not available. The clinical diagnosis was general paralysis of the insane. The Wassermann test with blood and cerebro-spinal fluid gave no reaction. The Lange test curve was 5554211000. Subsequent autopsy confirmed the clinical diagnosis of general paralysis of the insane.

CASE V.—L.W., a female, aged eleven years, had a history that for eighteen months she was noticed to be dull, walking peculiarly and gradually becoming more stupid. She was put back at school to Grade III from Grade IV. One sister was known to be suffering from congenital syphilis.

On examination she was childish and fatuous. Examination of the *fundus oculi* revealed disseminated chorioiditis. Her ankle jerks were diminished, the plantar reflexes were equivocal. Sensory examination was impossible because of non-cooperation. Her gait was unsteady; she walked on a wide base. The Romberg sign was positive.

On examination of the cerebro-spinal fluid the total protein was found to be 0·08%; the globulin test gave a positive result; there were 24 lymphocytes and 1 polymorphonuclear cell per cubic millimetre. The Lange test gave the following curve: 5555432100. The result of the Wassermann test was "++++±". The diagnosis was congenital tabo-paresis.

CASE VI.—A.B., a male, aged fifty-four years, gave a history that for six months he had suffered from "nerves" and insomnia, and was depressed. He was not clear in his mind, he wandered in his talk, was careless of himself and was unstable.

On examination the patient's cerebration was slow, he had tremor of the lips and tongue; his spastic gait was more pronounced on the left side; his deep reflexes were much increased; the plantar reflexes were extensor; there was no sensory loss.

On examination of the cerebro-spinal fluid the total protein was found to be 0·1%; the globulin test gave a positive reaction; there were eight lymphocytes per cubic millimetre. The Lange test gave the following curve: 5555321000. The Wassermann test gave a "++++±" reaction. The blood gave a "++++" reaction to the Wassermann test. The diagnosis was general paralysis of the insane.

CASE VII.—K.C., a male, aged thirty-seven years, gave a very vague and indefinite history. He had had incontinence of urine and fæces for three months; he had a sudden hemiplegia immediately before his admission to hospital.

On examination he was comatose. His pupils were equal; they did not react to light. Left hemiplegia was present. His systolic blood pressure was 220 and his diastolic pressure 110 millimetres of mercury. The cerebro-spinal fluid was blood-stained. Its total protein was 0·8%; the globulin test gave a positive reaction; the cells were not counted. The Lange test gave the following curve: 5555552221. The Wassermann test gave a "+++" reaction. The blood gave a "++++" reaction to the Wassermann test. The diagnosis was syphilis of the nervous system complicated by chronic nephritis and cerebral hæmorrhage.

CASE VIII.—J.G., a male patient, aged forty-five years, gave a history of syphilitic infection fifteen years before. He was complaining of pains under the ribs and typical lightning pains in both legs; he was unsteady at night, but had no mental symptoms.

On examination he had Argyll Robertson pupils. His knee and ankle jerks were absent; he had the typical sensory loss of *tabes dorsalis*.

Examination of the cerebro-spinal fluid revealed the total protein to be 0·05%; the globulin test gave a positive result; there were five lymphocytes per cubic millimetre. The Lange test gave the following curve: 5553321000. The result of the Wassermann test was "+++". The blood gave a "++" result to the Wassermann test. Intensive anti-syphilitic treatment was instituted, but the cerebro-spinal fluid findings remained unchanged. The diagnosis was *tabes dorsalis*.

CASE IX.—R.B., a male, aged twenty-four years, was presented as a sufferer from florid secondary syphilis, with a strongly positive blood Wassermann reaction. Intensive treatment was instituted, but the response to the Wassermann test remained strongly positive. No abnormal physical or mental signs developed.

Examination of the cerebro-spinal fluid showed a total protein content of 0·06%; the globulin test gave a positive result; there were six lymphocytes per cubic millimetre. The Wassermann test gave a "++++++" result. The Lange curve was 5554211000. The reaction of the blood to the Wassermann test was "++++++". The diagnosis was syphilis of the central nervous system without signs.

CASE X.—C.H., a female, aged fifty-seven years, gave a history that for ten weeks she had been unable to pass urine and had weakness of both legs. She had been unable to walk. Mentally she was very dull.

On examination there were signs of a transverse lesion of the spinal cord, but the level could not be determined owing to the mental condition of the patient.

Examination of the cerebro-spinal fluid showed the protein content to be 0·05%; the globulin test gave a positive result. There were eight lymphocytes per cubic millimetre. The curve from the Lange test was 5542100000. The reaction to the Wassermann test was "++". The reaction of the blood to the Wassermann test was "++". The diagnosis was syphilitic meningomyelitis.

CASE XI.—N.P., a male, aged seventeen years, gave a history of chronic osteomyelitis of the left femur for eight years. For three months he had suffered from pain in the back. Two days before his admission to hospital he developed a transverse lesion of the spinal cord. At first his muscles were flaccid, later they were spastic, with a level about the ninth dorsal segment.

Examination of the cerebro-spinal fluid showed the total protein content to be 0·48%. The globulin test gave a "+++" reaction. A large number of lymphocytes were found entangled in a fibrin clot. The Wassermann test gave no reaction. The curve from the Lange test was 5555422100. The blood did not react to the Wassermann test.

Autopsy revealed extensive suppuration around the vertebral bodies, with a large extradural abscess extending from the third dorsal to the second lumbar vertebra, anterior to the theca. No intrathecal or essential cord lesion was discovered. Culture from pus yielded Gram-positive streptococci and staphylococci.

CASE XII.—B.M., a female, aged four years, had a history that following the extraction of some teeth she developed pneumonia; she became very irritable and restless, and shortly afterwards dark red bullæ appeared on the feet. Cultures from these bullæ yielded hæmolytic streptococci. Some days later neck stiffness developed and Kernig's sign became positive.

Examination of the cerebro-spinal fluid showed the total protein to be 0·4%; the globulin test gave a "+++" result. The cerebro-spinal fluid was crowded with polymorphonuclear cells. Culture yielded hæmolytic streptococci. The curve from the Lange test was 5555421000.

Autopsy revealed extensive pyocephalus and suppurative meningitis. Pneumonia was present.

CASE XIII.—K.G., a male, aged eleven years, gave a history that for three weeks he had suffered from pain and stiffness in the legs, gradually becoming worse, until

the patient could not stand and the legs became powerless. Eight days later the ears commenced to discharge.

Examination revealed bilateral suppurative *otitis media*. Flaccid paraplegia was present, with a level at the eighth dorsal segment.

Examination of the cerebro-spinal fluid showed the total protein to be 1·8%; the globulin test gave a "+++" result. A large fibrin clot was present. Culture yielded pneumococci. The curve from the Lange test was 5542211110.

Autopsy revealed bilateral suppurative *otitis media*, suppurative meningitis and myelitis.

CASE XIV.—C.L., a female, aged sixty-two years, gave a history that for five years she had suffered from weakness, lassitude and pains in the joints, dating from an attack of "shingles". She was anæmic.

Examination revealed rheumatoid arthritis of all small joints; some large joints were involved. She was very pale. She ran a swinging temperature for which no adequate reason could be found.

Examination of the cerebro-spinal fluid showed the total protein to be 0·06%; the globulin test gave a faintly positive reaction. One lymphocyte per cubic millimetre was present. The Wassermann test gave no reaction. The curve from the Lange test was 5554310000. Blood culture yielded no result.

Autopsy revealed no gross lesion of viscera; there were signs of general toxæmia; rheumatoid arthritis was present; Gram-negative bacilli were cultured from the spleen. The diagnosis was probable septicæmia.

CASE XV.—N.P., a male, aged twenty-nine years, gave a history that for five months he had had difficulty in naming objects; he was mentally unstable and his memory was poor. Two months previously his left leg gave way and felt dead; it gradually became weaker. His left hand became peculiar and he had to concentrate to use it. His mental condition deteriorated. His vision became poor.

Examination revealed left hemiplegia; otherwise no abnormal physical signs were found.

Examination of the cerebro-spinal fluid showed the total protein to be 0·06%; the globulin test gave a faintly positive reaction. One lymphocyte per cubic millimetre of fluid was present. The Wassermann test gave no reaction. The curve from the Lange test was 5555532100. The blood did not react to the Wassermann test. The diagnosis was cerebral degeneration of unknown etiology.

CASE XVI.—D.H., a male, aged twenty-eight years, gave a history that for six months his right leg had been aching and weak; his foot dropped and dragged when he walked; gradually his left leg became similarly affected.

On examination the cranial nerves were normal. The deep reflexes were very active; he had a right ankle clonus; the right plantar reflex was extensor; tone was increased in both legs.

Examination of the cerebro-spinal fluid showed the total protein to be 0·07%; the globulin test gave a positive reaction; twelve lymphocytes per cubic millimetre were present. The Wassermann test gave no reaction. The curve from the Lange test was 5542100000. The blood did not react to the Wassermann test. The diagnosis was disseminated sclerosis.

CASE XVII.—L.B., a female, aged thirty-six years, gave a history that for twelve years she had suffered from progressive weakness of the legs with bilateral foot-drop; she had clumsiness of the hands, so that fine movements were impossible; she had double vision at times.

Examination revealed coarse nystagmus on lateral deviation. All deep reflexes were sluggish. Superficial abdominal reflexes were absent. Plantar reflexes were extensor. Some hesitation and uncertainty were noted in the performance of the finger-nose test. Impaired vibration and joint sense was present in both legs.

Examination of the cerebro-spinal fluid showed the total protein to be 0·06%; the globulin test gave a positive reaction. One lymphocyte per cubic millimetre was present. The Wassermann test gave no reaction. The curve from the Lange test was 5552110000. The blood did not react to the Wassermann test. The diagnosis was disseminated sclerosis.

CASE XVIII.—M.McG., a male, aged thirty-seven years, gave a history that for twelve months he had been erratic in speech and movement, worried and depressed; he had gradually become worse. His wife and his mates at work believed him to be dangerous. Previously he had been very intelligent.

On examination his speech was found to be slurred and thick; his tongue was tremulous. The left pupil was larger than the right; the reaction to light was sluggish. The deep reflexes were exaggerated. The plantar reflexes were flexor. No sensory change was detected.

Examination of the cerebro-spinal fluid showed the total protein to be 0·19%; the globulin test gave a positive reaction; 26 lymphocytes per cubic millimetre were present. The curve from the Lange test was 1122210000. The Wassermann test yielded a "++++++" reaction. The reaction of the blood to the Wassermann test was "+++++±". The diagnosis was syphilis of the nervous system, probably meningo-vascular in type. The patient left hospital against advice after three days.

PROTEIN IN THE CEREBRO-SPINAL FLUID: CLINICAL SIGNIFICANCE AND QUANTITATIVE DETERMINATION.

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KNOWLEDGE of the protein content of cerebro-spinal fluid is now known to be of considerable diagnostic and prognostic value in a number of surgical diseases of the central nervous system and its membranes. Quantitative protein determination in the cerebro-spinal fluid is a very simple process which can be rapidly carried out, and since the method is not generally well known, its description here may be useful. The determination depends upon matching the turbidity produced in a known volume of cerebro-spinal fluid after protein precipitation with 5% sulphosalicylic acid with that of a series of six standards containing known amounts of protein.

Quantitative Determination (after Panton and Marrack).

For quantitative determination the following are required:

1. Serum protein solution, 0·3%. This can be made up sufficiently accurately from normal serum by assuming that it contains 7% of protein and diluting it accordingly with normal saline solution.
2. A 5% solution of sulphosalicylic acid.
3. Graduated one and ten cubic centimetre pipettes.
4. A series of test-tubes of clear glass and equal bore.

To a series of tubes add 0·1, 0·2, 0·3, 0·4, 0·6 and 1·0 cubic centimetre of the protein solution and normal saline solution to make the volume up to 3·0 cubic centimetres. Add 3·0 cubic centimetres of sulphosalicylic acid to each and mix. Take 0·5 cubic centimetre of the cerebro-spinal fluid in another tube, add 0·5 cubic centimetre of normal

saline solution and 1·0 cubic centimetre of sulphosalicylic acid solution and mix. Compare this tube with those containing the standard protein solutions. Match the degrees of opacity.

The standard tubes correspond to protein concentrations of 20, 40, 60, 80, 120 and 200 milligrammes *per centum* respectively.

Hitherto the quantitative determination of cerebro-spinal fluid protein has been restricted mainly to the investigation of syphilitic diseases of the central nervous system. In tabes and meningovascular syphilis the normal protein content, 20 to 40 milligrammes *per centum*, is increased up to 30 to 80 milligrammes, and at the same time there is a disproportionate increase in the globulin fraction of the protein content. This globulin increase is evidence of a syphilitic infection and determines the positive result of the serum tests which are applied to the cerebro-spinal fluid in this condition. Thus in the Nonne-Apelt reaction the globulin is precipitated with saturated ammonium sulphate solution, while in the colloidal benzoin and the colloidal gold reactions the characteristic luetic curves are thought to be produced by the flocculation of excess globulin, which overcomes the action of the smaller albumin fraction in normally inhibiting flocculation. It is well recognised, too, that in all meningeal infections the protein content is increased; in septic meningitis and in tuberculous meningitis the protein may range from 50 to 150 or more milligrammes *per centum*. In disseminated sclerosis, too, there is usually a slight increase in protein content.

It may be useful briefly to consider the value of quantitative protein determinations in surgical diseases of the intracranial contents. It is recognised that the presence or absence of small increases in protein content provides valuable information. In cerebral abscess an increase in protein will be found in practically every case, even when the abscess is deeply situated. The explanation of this is probably the fact that an adequate centrifugal circulation is provided by the Virchow-Robin spaces to enable the discharge of protein from œdematous areas of cerebral tissue surrounding the abscess. Even after apparently adequate surgical drainage of a cerebral abscess cure should not be considered to have been effected, and a guarded prognosis should be given while the protein remains at a level above that of high normal. Most intracranial neoplasms, particularly if they arise from the arachnoid and more particularly if they are situated in the posterior fossa, will cause an increase in cerebro-spinal fluid protein. It may be said that with one possible exception, namely, cholesteatoma, all posterior fossa neoplasms cause an increase in protein content, whether they are intracerebellar or extracerebellar in origin. This is due no doubt to the relatively smaller size of the cerebellum and its intimate contact with the fluid, not only in the convexities, but also in the fourth ventricle.

Above the tentorium protein increase is most likely to be caused by meningiomata or by any other cerebral growths which have arisen at or have grown into contact with the surface of the hemispheres or the ventricular ependyma. It should be remembered, in dealing with deeply situated growths in contact with the ventricles, that the great bulk of protein is added to the cerebro-spinal fluid after it passes out of the ventricular system into the subarachnoid spaces. Fluid taken from the lateral ventricles should be relatively free from protein, and if fluid taken at ventricular estimation contains more than a low normal of protein, the increase may be considered to be pathological. Estimation of the protein in specimens of fluid taken from both lateral ventricles may be of localizing significance, since tumours which are in contact with one ventricle may produce an increased protein content in the fluid in that ventricle with little or no increase in the contralateral ventricle. In the third ventricle the well-known colloid cyst does not cause any increase in protein; and this knowledge may be of great value in the differentiation of this condition from other tumours in the same ventricle, particularly spongioblastoma. The former condition is capable of complete surgical removal and cure, while the latter is hopeless.

An interesting observation has been made in a number of cerebral post-traumatic cases at Lewisham Hospital. Some patients who might be described as suffering from typical post-traumatic neurosis or traumatic cephalalgia presented themselves several months after head injury complaining of headaches and of a number of indefinite symptoms, such as inability to concentrate, irritability, insomnia, anxiety and indecision. Exhaustive neurological examination of these patients disclosed no abnormal physical signs, and at once the time-worn problem had to be confronted as to whether the symptoms described by them were based on organic or functional changes in the central nervous system. In a number of instances measurements were made of the cerebro-spinal fluid pressure, free circulation of fluid was investigated by Queckenstedt tests (jugular vein compression) and the quantitative protein content of the cerebro-spinal fluid was determined. A group of cases has been discovered in which there is an increase in the cerebro-spinal fluid pressure of 150 millimetres or more, in the presence of normal blood pressure, and in which the cerebro-spinal protein is slightly increased or is at very high normal levels. It seems likely, then, that cerebral injury, without producing any objective signs of persistent damage, can modify the cerebro-spinal fluid circulation to produce an increased level of pressure while the patient is at rest, which in some cases at least is accompanied by increase in the quantitative protein content. Sufficient evidence is not yet available to justify the formation of an opinion of any value on this point, but it would seem most unwise to regard post-traumatic conditions in which the patients complain of indefinite subjective symptoms as functional until the cerebro-spinal fluid pressure and protein content have been measured.

Cerebro-spinal Protein.

Condition.	Milligrammes *per Centum*.
Normal	20 to 40
Septic meningitis	50 to 200 (+)
Tuberculous meningitis	50 to 200 (+)
Syphilitic meningitis	50 to 200 (+) (globulin +)
Tabes dorsalis	20 to 60 (globulin +)
General paralysis	50 to 100 (globulin +)
Disseminated sclerosis	30 to 60
Cerebral abscess	50 to 150 (+)
Intracranial neoplasms (in contact with cerebro-spinal fluid)	30 to 80
Froin's syndrome	Up to 2,000

The cerebro-spinal protein in different conditions is shown in the accompanying table in milligrammes *per centum*.

GASTRO-INTESTINAL SYMPTOMS OF HYPOGLYCÆMIA.

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GASTRIC motility and the sensation of hunger are closely influenced by the blood sugar level. A falling blood sugar is usually accompanied by increased gastric peristalsis and is one of the main factors in the production of appetite. For this reason the use of insulin, with the subsequent lowering of blood sugar, often produces a dramatic return of appetite where none previously existed.

Graham[2] quotes Carlson and his associates as having shown that "hypoglycæmia is associated with violent contractions of the stomach". However, other authors state that hypoglycæmia of about 0·075% provoked gastric contractions, whereas with still lower depressions (about 0·045%) gastric atony developed. La Barre[3] produced experimental evidence to show that it was primarily the lowering of the blood sugar level that increased gastric activity, both muscular and secretory.

Extreme hunger, then, is a common symptom of the less severe types of hypoglycæmia. I have referred to this in a previous publication,[4] where several of the patients reported on were noted for their prodigious appetites. In this same paper mention was also made of other gastro-intestinal manifestations.

Seale Harris has done more than anyone in drawing attention to the importance and frequent occurrence of hypoglycæmia. A recent reprint of his[5] concerning these gastro-intestinal symptoms prompted me to publish these cases, especially as Harris's original article was printed in a journal not commonly available here.

Hypoglycæmic symptoms are not infrequently found in patients who suffer from the various manifestations of disorders of the stomach and other abdominal viscera. This is particularly true of patients, ordinarily classed as neurotics, who go from one specialist to another for relief from "nervous indigestion". This does not imply that all "nervous indigestion" is due to hypoglycæmia.

The symptoms of hypoglycæmia may vary greatly, but a careful study of the patient's history will often give a clue to the correct diagnosis. The true hypoglycæmic basis may be so clouded by a medley of neurotic complaints that the diagnosis may easily be overlooked. In fact, the recital of these symptoms tends to make both the patient and physician forget the earlier history, a study of which will usually reveal the underlying hypoglycæmia. Excessive appetite and a feeling of intense hunger, even soon after a meal, are the commonest findings.

CASE I.—The patient, a female aged thirty-six years, complained of insatiable hunger; even after a large meal she still felt hungry, and was quite ashamed of herself. Frequent meals did not relieve this symptom. In addition, attacks of asthma occurred almost nightly. A loss of weight of three stone had occurred in three years. Investigations, including a test meal and gastro-intestinal X ray examination, gave negative results. A glucose tolerance test revealed the following figures:

Fasting.	½ hour.	1 hour.	1½ hours.	2 hours.
0·062	0·093	0·123	0·093	0·093

The administration of glucose relieved both the sensations of hunger and the attacks of asthma. After treatment a gain in weight occurred until the previous normal level was reached.

One to two hours after meals, or sooner, discomfort and often pain develop in the epigastrium, just as in the case of a duodenal ulcer. However, this localized pain or discomfort is usually accompanied by more generalized symptoms than when a local gastric or duodenal lesion is present. The symptoms usually seen are weakness, faintness, giddiness and sweating.

CASE II.—The patient, a female aged thirty-three years, complained of "indigestion" for two years. At first she had noticed flatulence soon after meals, but later a weak, empty feeling developed, especially about midday. At the same time she felt as though she was going to collapse and broke out into a cold perspiration. After this she usually brought up a considerable amount of wind. Food brought about recovery from these sensations. Irritability and a trembly sensation were present when the patient woke in the morning, but improved when she drank a cup of tea. She was energetic, but tired very quickly, and had to eat every two or three hours in order to relieve the abdominal discomfort. Treatment by frequent feeding and alkalis had given no relief. Investigations of the gastro-intestinal tract revealed no abnormality, except for a rapidly emptying stomach. The fasting blood sugar level was 0·070%.

If the symptoms had been due to a rapidly emptying stomach, frequent meals and sedatives should have given relief, whereas they did not. The addition of glucose caused a disappearance of all symptoms, and six months later the patient felt perfectly well.

The local discomfort associated with hypoglycæmia is frequently in the nature of a sinking feeling accompanied by light-headedness and a sensation of impending dissolution. The patient may feel nervous and trembly, and bouts of crying may also occur.

CASE III.—The patient, a male, thirty-eight years of age, complained of lack of energy and a general feeling of depression and nervousness. About two to three hours after a meal he noticed a severe pain in the epigastrium, accompanied by extreme fatigue, irritability and a feeling of depression so marked that he frequently burst into tears. All symptoms were worse in the early morning, and especially in the hot weather. Symptoms were quickly relieved by food, but returned in two or three hours. Complete examination revealed no abnormality except a fasting blood sugar level of 0·077%. Frequent meals and glucose brought about a rapid disappearance of symptoms. There has been no recurrence during the last three years, and now glucose has been omitted, reliance being placed on frequent meals.

If meals are delayed, the symptoms will occur and are often accompanied by an intense headache, which disappears when food is taken. I have seen palpitation and paroxysmal tachycardia occur in association with the epigastric discomfort. Symptoms in most cases are present when the patient rises in the morning, and may awaken him as early as 2 or 3 a.m. Relief is obtained by food or a cup of tea. The patient wakes tired and weak, and sometimes staggers after getting out of bed. The symptoms, although relieved by food, usually return in two or three hours.

CASE IV.—The patient, a male, thirty years of age, complained of indigestion for the past twelve to fourteen years. At first there had been periods of freedom lasting up to eighteen months, but for the previous three years there had been no intermissions. Two years previously, when the patient was seen by a physician, the following history was taken:

> When he wakes in the morning he has a burning in the stomach with a desire to vomit, and is unable to eat breakfast. Later has milk and vegetable diet, which causes a full feeling. Meat causes pain in the epigastrium. More comfortable at night. There had been attacks of epigastric pain between meals, relieved by food.

A test meal gave normal findings and gastro-intestinal X ray examination revealed gastroptosis and hypotonicity. The patient was given a bromide mixture and advised to wear a belt. His condition improved for two or three weeks, but he quickly relapsed into his former state. Two years later additional factors concerning his history were elicited. Practically every morning he awakened with an empty feeling and was unable to get up without a cup of tea and a biscuit. If he did not have these he would be giddy and develop a severe headache. By about 10.30 a.m. he had to eat more food in order to carry on till lunch time. By about 3.30 p.m. weakness again developed and he had to have more food. At times he had to get up about two or three in the morning to get some food in order to relieve the symptoms. Some years previously he had suffered from migraine, which had at times been accompanied by abdominal pain. The results of a glucose tolerance test were as follows:

Fasting	½ hour.	1 hour.	1½ hours.	2 hours.
0·062	0·125	0·123	0·077	0·062

An element of food allergy also was present in this patient, and it was necessary to omit milk and eggs from his diet. Following this procedure and with the addition of glucose he has kept well for the past ten months.

Actual distaste for food may occur in hypoglycæmic patients and is possibly related to the gastric atonia mentioned earlier, although no actual proof of this exists. These people learn to eat at frequent intervals in order to be able to carry on. As with duodenal ulcer, food relieves the symptoms, but alkalis are of no benefit. It is important to remember that hypoglycæmia may coexist with a proved intraabdominal lesion, and unless this condition is adequately treated complete relief will not be obtained.

As Harris[5] pointed out, the gastro-intestinal symptoms of hypoglycæmia may simulate those of duodenal ulcer, gall-bladder disease, irritable colon, appendicitis, pancreatitis, and more especially the neuroses of the stomach and intestine. Careful studies of the latter group will thus rescue at least a few people from the scrap-heap of abdominal neuroses. Although it must be admitted that the groups are hard to differentiate, yet a careful history-taking, blood sugar studies and results of treatment distinguish between the two types. Frequent meals and glucose will relieve the symptoms of hypoglycæmia, frequently paving the way for a cure of the superadded neurosis. In the neuroses these lines of treatment will not produce the same dramatic results.

Treatment.

Frequent meals and glucose will often give dramatic relief of symptoms. My experience has been that after this *régime* has been followed, in the milder cases the blood sugar level will often return to normal. For this reason it is my opinion that hypoglycæmia in many of those milder cases is due to a disturbed liver function, particularly with regard to the liver's capacity to maintain the necessary supply of glycogen for conversion to glucose.

A high carbohydrate diet will increase sensitivity to insulin so that in those cases which are due to hyperinsulinism it would be expected to lower still further the blood sugar level. Harris has recommended for hyperinsulinism a high fat, low carbohydrate diet with frequent meals. This raises the blood sugar level and appears the most rational line of treatment in cases of insulin excess. On the other hand, if the liver is at fault, a high carbohydrate diet with frequent meals, such as has been adopted in my cases, seems justified, and response to this treatment is good.

Test Meals.

In view of the apparent frequency of a low blood sugar level in persons complaining of gastro-intestinal symptoms, Harris has recommended the performance of a routine fasting blood sugar test in these cases. I have had test meals given and the fasting blood sugar estimated in 177 cases, there being 22 (or 12·4% of these patients) with a fasting blood sugar level of less than 0·080%. Further, in a series of 100 patients with symptoms of hypoglycæmia the average fasting blood sugar level was 0·071%. In 136 patients showing no clinical evidence of hypoglycæmia the figure was 0·102%. The Hagedorn-Jensen method was used in performing these blood sugar estimations, the tests in both normal and hypoglycæmic patients being performed by the same technician.

At this stage I feel the necessity of sounding a note of caution with regard to the haphazard use of glucose. During the last few years there has been a definite tendency to prescribe glucose for all and sundry, especially if any degree of debility exists. This extensive use of glucose is bad for two reasons; first, the possibility of harmful effects in unsuitable cases, and secondly, the absence of response to its use in unsuitable cases will lead to a very useful therapeutic agent falling into disrepute. The use of glucose should be restricted to patients suffering from hypoglycæmia, from acidosis, from starvation, from cyclical vomiting, from some of the manifestations of allergy, and pre-operatively and post-operatively.

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Reports of Cases.

DEATH FROM AIR EMBOLISM DUE TO ATTEMPTED ABORTION, WITH A MEDICO-LEGAL INTEREST.

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ON October 19, 1936, the Adelaide police surgeon, Dr. Welch, asked me to visit a house where he had been called to the body of a dead woman. I found fresh soap about the woman's vulva. The following day I performed a *post mortem* examination on the body and recorded the following facts.

The body was that of a well-developed woman in good physical condition, looking about forty years of age. Her face was pale, her expression was peaceful, and the lips were of a pale bluish tint. *Rigor mortis* was marked and *post mortem* staining was present at the back. On the back of the right thigh, about half-way down it, there was a scratch about five inches in length, extending from the back of the thigh around the inner side, slightly downwards and forwards, and tapering off to a thin streak as it came forwards. The skin was scratched up from behind forwards. There was a small amount of blood about the vulva and a distinct smell of soap was noticed. The blood was mixed with soap and the skin, where stained with the mixture of blood and soap, had a glistening appearance, and small bubbles were retained on the hairs when these were lathered. The pubic and vulval hairs had been clipped short. The breasts were distended and a milky secretion could be expressed from them. The abdomen was very large, and a mass, apparently the uterus, could be felt extending up to the umbilicus. On opening the abdomen the uterus was found enlarged to two hands' breadth above the pubis. On its surface there were several small fibroid tumours, the largest being about half an inch in diameter. The uterus was soft and the fœtus could be felt within it. The veins of the left broad ligament were filled with air, the tissues themselves having a normal appearance, but large air bubbles could be seen inside the veins and could be moved backwards and forwards inside these enlarged vessels. The right broad ligament showed a lot of bruising, with a certain amount of effused blood extending from the ligament up to the right psoas muscle. The broad ligament itself contained a large amount of air lying free within the layers of the ligament. The tissue of the ligament was not in any way friable, and there was no smell about it to suggest the presence of gas gangrene. The cervix was dilated (to the size of a forefinger) and softened, and on the posterior aspect of the internal os there was a slight laceration, and, leading up from this, a patch of membranes on the posterior wall of the uterus had been stripped up. This patch of stripped membranes was about an inch and a half across, and extended upwards to the edge of the placenta, which itself had been ploughed up over about a quarter of its extent, there being a deep laceration in its substance. The uterine wall was very tough, and there was no smell suggesting gas gangrene. There was a smell of soap about the inside of the uterus, particularly strong over the area of the stripped membranes. The uterus contained a fœtus of about six months' development. On opening the chest the lungs did not collapse. They were both normal in appearance. The pericardium was normal. Minute bubbles of air could be seen in the vessels on the surface of the heart. There were numbers of these. On palpating the heart a large amount of air could be heard gurgling inside the right side of the heart, and on opening the right ventricle frothy fluid blood ran out. The heart muscle was soft, but the heart was otherwise normal. The rest of the *post mortem* examination revealed nothing abnormal except slight enlargement of the kidneys, spleen and thyreoid, and some air bubbles in the cortical cerebral vessels.

It was considered that with a disrupted *placenta prævia*, with little blood about the vulva and the heart with a large quantity of air within it, death must have been very sudden. It was also thought that the air, which had obviously gained entry through the placental sinuses, must have been injected forcibly into the uterus to have distended the uterine veins to such an extent and to have ruptured some in the right broad ligament, causing the bruising of that ligament and allowing the air to enter it. The possibility of gas gangrene was put beyond dispute by negative bacteriological cultures, and sections of the right broad ligament showed no sign of any bacterial invasion.

In view of the circumstances of the case, a Mrs. Beatrice Edith Sayers was committed from the Adelaide Coroner's Court for the murder of the woman Hilda Amelia Ann Hillyer, and the case was heard before His Honour Mr. Justice Cleland, commencing on December 9, 1936. The Crown preferred a charge of manslaughter, to which Mrs. Sayers entered a plea of not guilty. The medical interest in the case lies in the ingenious medical theory put forward to throw doubt upon the Crown case. The Crown case showed that Hillyer, apparently in normal health, went to the accused's house some time after 9.30 a.m. on Monday, October 19, 1936, with £17 in her purse, and equipped with a shopping bag, two night-gowns, a dressing jacket and a tooth-brush, and by about 11 a.m. of the same day she was dead of air embolism. Sayers declared that she was the only person in the house with the deceased, and a careful search by the police did not reveal any instruments with which an abortion could have been performed. It was considered impossible that the deceased could have disposed of any instruments herself, for example, after an attempt at self-abortion, and it was therefore surmised that Sayers had had the instruments disposed of before informing the police of the death, which she did through her solicitor at about 1 p.m., that is, about two hours after the death. Evidence was produced and admitted that the accused had advertised in the Adelaide *Advertiser* on a large number of occasions under "Medical", inviting ladies to consult her about their health.

The case appeared to leave no doubt that Sayers had attempted to procure an abortion on Hillyer and thereby caused her death by air embolism; but counsel for the

defence produced medical evidence of a theoretical nature which suggested, on account of the slight dilatation of the cervix and a few blood stains on the deceased's bloomers, that Hillyer was in labour some time, hours at least, prior to death, and so must have been interfered with before she went to Mrs. Sayers's place; and that in the first interference air gained entry to the uterus, where it lay dormant while she was walking about until she got to the accused's house, when unfortunately it migrated to the heart and caused the death without the accused's being in any way responsible. The jury returned a verdict of "guilty of manslaughter" with a strong recommendation to mercy, and in view of this the judge sentenced the accused to eighteen months' hard labour.

Reviews.

MEDICAL DIAGNOSIS.

"MEDICAL DIAGNOSIS", by Simpson, is intended primarily for the general practitioner, but also for the student preparing for his final or more advanced medical examination.[1] It should be particularly useful for the latter, as it gives in a comparatively small compass a bird's-eye view of medicine from a purely clinical aspect. To achieve this result in a book of only 240 pages is no mean feat. The author's style is clear, and his description of symptoms and diseases is accurate without being verbose. There is not a word of padding in the whole book. Occasionally, perhaps, condensation has been carried a trifle too far. The accounts, for instance, of the Van den Bergh reaction and of the urea clearance test, while perfectly intelligible to one already familiar with these procedures, would convey very little to the student who had had no previous experience of them. Since, however, the book is intended only for those who are presumably well acquainted with these tests, this criticism loses force. For the painstaking accuracy with which the clinical descriptions are compiled, nothing but praise is possible. The student wishing to revise his clinical medicine, and the practitioner in a hurry to check up the main symptoms of a disease entity, will find this book a very present help in trouble. It is divided into twelve chapters, covering the various systems, cardio-vascular, pulmonary, renal, nervous *et cetera*, with a useful appendix of tables showing the minimum amount of blood that should be collected for various chemical tests; the normal physiological values of the different constituents of whole blood, serum and plasma; the normal composition of cerebro-spinal fluid, faeces and urine; and various points in serology.

There is also a chapter on diseases of children, indicative of the more common diagnostic difficulties met with in this branch of medicine, with hints on their solution.

This is not a text-book of medicine. It does not attain to complete comprehensiveness and the discussion of rarities, but the author's endeavour to include all the essentials of ordinary clinical medicine has been singularly successful. The book can be confidently recommended as a useful addition to the library both of the student and the general practitioner.

TISSUE METABOLISM.

IN what Sir Frederick Gowland Hopkins describes as "a highly original book", Dr. Eric Holmes gives a valuable survey of recent work on the metabolism of living tissues.[1] The matter is treated in an elementary manner and has been collected primarily for the use of students commencing the study of biological chemistry in the Cambridge school. The book will, however, be appreciated also by more senior students and by maturer readers who seek a brief but comprehensive survey, free from unessential detail, of the present knowledge of tissue metabolism.

A general discussion of the methods of investigating tissue metabolism, enzymes and biological oxidations is followed by consideration of the metabolism of particular tissues: the liver, the kidney, muscle and nerve. The part played by the endocrine glands in the correlation of the activities of different tissues is discussed, and a brief review is given of the function of hormones and vitamins and the part played in the body by certain inorganic substances.

The author has dealt with his subject from the point of view of the living organism. He considers particular chemical compounds only in so far as they may be concerned in the activities of the body. He is not interested in the "fate" of various groups of compounds, to which the usual text-book of biological chemistry gives so much space.

Our knowledge of tissue metabolism is still very fragmentary. While Dr. Holmes places all due emphasis on this fact, he has imparted a pleasing continuity to his treatment of his subject. It is a subject on which he is well qualified to write, for we are indebted to him for many contributions to it, especially on the metabolism of nerve. He is to be congratulated on the satisfactory way in which he has collated the results of such highly specialized research. He has presented their essential features in a fascinating little book which will appeal alike to the specialist and the general medical reader. The book contains a useful index.

Notes on Books, Current Journals and New Appliances.

AUSTRALIAN SPIDERS.

IN "Spider Wonders of Australia" Mr. Keith C. McKeown has produced a book of extraordinary interest.[2] The author, who is assistant entomologist in the Australian Museum, is well known as an authority on Australian insect life, and this account of his observations on the Arachnida well maintains the high standard of his previous work. The systematic study of spiders has been largely neglected in Australia; this book, therefore, giving a faithful account of their habits so far as they are known, should provide useful material for the scientist as well as entertainment for the general reader. There are many facts of importance from a medical viewpoint. Thus it is enlightening to learn that of some twelve hundred species recorded in Australia, only three spiders have been proved to be dangerous to man. The distribution, habits, method of attack *et cetera* of the deadly funnel-web and red-backed spiders are fully discussed, and chapters are also devoted to the habits of Australian ticks and scorpions.

Mr. McKeown has an easy and pleasant style, and his account of life in the spider world can be followed with intense interest. He writes of spiders that angle with line and bait, of spiders that cast nets for prey, of spiders that snare birds and fish; while the chapter on the "courtship and marriage" of spiders is an amazing story of savage love-making and cannibalism among these strange creatures.

The book is accurately printed and the photographic illustrations adequately supplement the text.

[1] "General Practice Series. Medical Diagnosis: Some Clinical Aspects", by S. L. Simpson, M.A., M.D., M.R.C.P.; 1937. London: H. K. Lewis and Company Limited. Demy 8vo, pp. 268. Price: 10s. 6d. net.

[1] "The Metabolism of Living Tissues", by E. Holmes, M.A., M.D.; 1937. Cambridge: The University Press. Crown 8vo, pp. 245. Price: 7s. 6d. net.

[2] "Spider Wonders of Australia", by K. C. McKeown; 1936. Australia: Angus and Robertson, Limited. Crown 8vo, pp. 284, with illustrations. Price: 8s. net.

The Medical Journal of Australia

SATURDAY, JULY 31, 1937.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

THE MEDICAL RESEARCH ENDOWMENT ACT.

THE Parliament of the Commonwealth of Australia has passed a bill for an act "to constitute a fund to be utilized for the purposes of medical research". The short title of the act is the *Medical Research Endowment Act*, 1937. Under the provisions of the act is established a fund to be known as the Medical Research Endowment Fund. The fund is to consist of "(*a*) such amounts as are appropriated from time to time by the Parliament, and of income derived from the investment of those amounts or any part thereof; and (*b*) gifts or bequests given or made for the purposes of the fund and the income derived from or proceeds of the realization of the property so given or bequeathed". The fund is to be vested in and administered by the Minister. The act directs that the fund shall "be applied to provide assistance—(*a*) to Departments of the Commonwealth or of a State engaged in medical research; (*b*) to Universities for the purpose of medical research; (*c*) to institutions and persons engaged in medical research; and (*d*) in the training of persons in medical research". Assistance in the training of persons in medical research is to be provided upon conditions determined by the Minister, acting on the advice of the National Health and Medical Research Council.

No sum of money is mentioned in the act, and this is unfortunate, for many will see in the omission nothing but another disappointment in the battle for the furtherance of medical research and its endowment in Australia. Those who have striven to put research in the medical sciences on a proper footing have had to be content with slow progress and have often been bitterly disappointed. There is no doubt, however, that they will gain their objective. That Parliament has recognized the need for medical research is surely a matter for congratulation; medical research has received national recognition, and we cannot believe that a responsible body such as the Commonwealth Parliament would stultify itself by passing an act of national importance if it intended to allow that act to remain as an example of parliamentary draftsmanship alone.

Two meetings of the National Health and Medical Research Council have been held, the first at Hobart early in this year, the second as recently as June 1 and 2, 1937, at Canberra. At the Hobart meeting a general research scheme was formulated and hopes rose high. It will be remembered that the suggestion was made that the sum of £30,000 should be provided every year for the efficient carrying out of research; and this journal was not alone in expressing the view that the grant should be made a permanent endowment, so that the National Health and Medical Research Council would not be at the mercy of any Federal treasurer who was looking for ways and means of cutting down official expenditure. At the second meeting many of the members expressed disappointment at the failure of the Government to supply the necessary money. That the Government had merely postponed payment and had not refused to honour what was regarded as its obligation was, however, emphasized by the Chairman, Dr. J. H. L. Cumpston, Commonwealth Director-General of Health. Incidentally it

may be stated that the people of Australia owe a great debt of gratitude to Dr. Cumpston for his single-mindedness, his determination and his clarity of vision in this, as in many other matters. The Council adopted for presentation to the Acting Prime Minister a memorandum embodying its views on research formulated at the Hobart meeting and urging the Government to make an early decision. Since then the *Medical Research Endowment Act* has been passed. Like many others, we should like to see the endowment of the National Health and Medical Research Council accomplished, but nothing will be gained by impatience. It would be wise to take every available opportunity of impressing on those in high places the view expressed by the Council in its recent memorandum, that the Government should not regard Australia as an isolated outpost content to await results of investigation elsewhere, but as a country to be recognized as a national centre of medical science, which has already made important contributions to the world's knowledge.

Current Comment.

BENZEDRINE SULPHATE.

NOT for many years has a new therapeutic agent excited so much interest as has benzedrine. Already a voluminous literature has grown concerning it, and even the lay Press has given more than a passing reference to this drug, extolling its virtues and possibilities. Benzedrine is β-phenylisopropylamine; it is closely allied, both in structure and action, to adrenaline and ephedrine. G. Barger and H. H. Dale described this compound in 1910 as a member of a group of amines which they termed sympathomimetic. However, it received no detailed consideration until 1930. The volatile base has come largely into use as an astringent in conditions of rhinitis, under the name of "Isomyn". Exhibition of the sulphate was found to produce insomnia, and on that account it has been employed in narcolepsy, in which it gives greater relief than adrenaline.

E. Guttmann and W. Sargant state that benzedrine paralyses intestinal activity. It raises blood pressure and acts generally on the vegetative nervous system; it does not affect blood sugar levels.[1] Guttmann and Sargant investigated the action of benzedrine on the cardio-vascular system, and especially observed the psychological effects induced by its administration. They noticed that the more vasolabile individuals, under its use, complained of dizziness, shivering feelings, palpitation, tremors or anorexia. The speed of absorption appeared to influence the occurrence of these reactions, indicating that the drug should not be given to patients with an empty stomach. The influence of small doses on blood pressure was small, but fluctuations of ten to thirty millimetres were sometimes seen. Benzedrine was found to induce a general psychological stimulation, with increased confidence, initiative and ease in making decisions, at times combined with a feeling of restlessness. A condition of loquacity is also produced. A pleasant feeling, amounting to euphoria, has been reported. Thinking processes seem to be accelerated, without impairment of attention, concentration or judgement. Mild depression and hesitation are lessened. Benzedrine has been found of value to those engaged in lecturing and to students undergoing examination. Anxiety states are sometimes greatly ameliorated. Larger doses than ten to thirty milligrammes sometimes produce so much palpitation, tremor and elevation of blood pressure that concomitant psychological effects are apt to be destroyed. Guttmann and Sargant insist that the possibility of addiction needs consideration, although none of their own patients showed any such tendency.

P. Solomon, R. S. Mitchell and M. Prinzmetal have considered the uses of benzedrine in twenty-eight cases of post-encephalitic Parkinsonism.[1] They concluded that beneficial effects from benzedrine alone or in combination with stramonium or hyoscine were manifested in twenty-six of the patients. The most uniform result was a feeling of increased energy and well-being. Drowsiness and the need for sleep during the day were entirely removed from those patients who had previously suffered from such manifestations. In twenty patients muscular rigidity diminished. Tremor disappeared in some. Eight patients of the series had frequent oculogyric crises, which had not been controlled by stramonium or hyoscine. When benzedrine was employed, the crises entirely disappeared in six and were greatly ameliorated in the other two. Ten patients, aged from fifty-eight to seventy-six years, suffering from arteriosclerotic Parkinsonism were also treated by benzedrine. Their chief complaints were coarse tremor of the extremities and, in contradistinction to the post-encephalitic series, mental agitation, which was extreme in two of them. The condition of only one improved, that of three was unaltered, and six became worse. Solomon and his colleagues administered benzedrine sulphate also to twenty-two patients suffering from various psychoneuroses, the principal manifestations being lack of energy, drowsiness, weakness and easy fatigue. In twenty of the cases no improvement was effected. Both in this group and in the

[1] *The British Medical Journal*, May 15, 1937.

[1] *The Journal of the American Medical Association*, May 22, 1937.

arteriosclerotic series untoward effects were of frequent occurrence. These included dryness of the tongue and mouth, nausea, vomiting, dizziness, a feeling of nervous tension, excessive restlessness and excitement, and insomnia. Under benzedrine treatment patients with involutional melancholia became worse, and auditory hallucinations with paranoid ideas have arisen in another case. Nothing indicative of tolerance or habit formation was observed.

E. Davidoff and E. C. Reifenstein discuss the stimulating action of benzedrine sulphate and give the results of a study of the responses of normal persons and of depressed patients to that preparation.[1] They insist that more extensive investigation of the action of the drug is essential before finality is reached. Sixty-five persons, including ten normals, were investigated, and it was concluded that benzedrine was more stimulating to normal persons than to self-absorbed or depressed patients. It was more effective in increasing motor activity, speech activity and general efficiency than in elevating the mood. It was more valuable in the organic depressions, especially the alcoholic, than in those of psychogenic origin. Benzedrine may be useful in differentiating states of depression due to alcohol alone, which are generally dissipated rapidly by the drug, from states of alcoholic depression superimposed upon and masking depressions of psychogenic origin. These do not respond readily to the drug. Davidoff and Reifenstein also consider that benzedrine may render depressed or self-absorbed patients more accessible to investigation or to psychotherapy. It may be useful in reducing weight.

Benefit accruing from benzedrine therapy, however, may be counterbalanced by unfavourable reactions arising during its administration. Consequently this drug must be used only with caution and in favourable circumstances. Davidoff and Reifenstein are not satisfied that in all cases prolonged exhibition will confer benefit that would not result from a brief administration with adequate dosage. They state that, without further study, the question of habit formation cannot be answered satisfactorily, but that there is sufficient evidence to justify the issue of a warning against its promiscuous use. Investigators agree that definite contra-indications are hypertension, coronary artery disease and a state of manic excitement. In most forms of cardio-vascular disorder it should be avoided. Harmful possibilities also occur with idiosyncrasy to small doses; in severe forms of vasomotor instability, with wide daily fluctuations in blood pressure or pulse rate; in anorexia, insomnia and lowered bodily resistance. When there is a tendency to physical over-activity, as seen in agitated depressions, or when there is a history of previous excitement, as in catatonic *dementia præcox*, epilepsy and mental deficiency, or a history of suicidal or homicidal tendencies or convulsive seizures, the greatest caution must be observed in its use. Amongst indications for its use may be included the relief of gastro-intestinal spasm, overdosage with barbiturates, preparation of individuals for times of excessive physical or mental exertion, and as an adjuvant to atropine, hyoscine or stramonium in the relief of migraine.

Benzedrine is truly a drug that is likely to confer benefit in many distressing conditions, but it also has untoward possibilities.

[1] *The Journal of the American Medical Association*, May 22, 1937.

PROGRESS IN MEDICINE DURING 1936.

AN endeavour is made in these columns to comment on the more important contributions to current medical literature; particular stress is laid on new work and the needs of the general practitioner are constantly borne in mind. It is therefore suitable that attention should be drawn in this place to the publication of "The Medical Annual" for 1937.[1] This publication is, or should be, well known to all medical practitioners. It has appeared regularly for fifty-five years and is described as "A Year Book of Treatment and Practitioners' Index". The editors are H. Letheby Tidy and A. Rendle Short, and the contributors, who number thirty-four, are with one exception well known in medical literature; the exception is a barrister-at-law, who writes on legal decisions and enactments of recent date. The subjects are treated in alphabetical order, and the contributions consist of short descriptions of work carried out during the year; in most instances a short abstract of the conclusions of authors is given and sometimes a comment is added. In the introduction the editors point out that no outstanding achievement took place during 1936, but that at the same time the progress has not been negligible. They believe that physiology and medical research are coming into closer relationship with clinical medicine. They also state that preventive medicine is now regarded as a continuous duty of the medical profession and as an essential part of the training of the medical student; this is reflected in the articles in "The Medical Annual".

Obviously it is quite impossible to review the contents of this book; it is itself a concentrated review of the work of many authors. It can, however, be recommended as an indispensable book of reference.

[1] "The Medical Annual: A Year Book of Treatment and Practitioners' Index, 1937", edited by H. L. Tidy, M.A., M.D. (Oxon), F.R.C.P., and A. R. Short, M.D., B.S., B.Sc., F.R.C.S.; 1937. Bristol: John Wright and Sons, Limited; London: Simpkin Marshall Limited. Demy 8vo, pp. 776. Price: 20s. net.

THE ADELAIDE CONGRESS.

ALL those who intend to become members of the forthcoming congress to be held at Adelaide on August 23 to 28, 1937, are urged to make application for membership without delay. The executive committee wishes to issue invitations to and to have membership medals struck for those who attend. Final arrangements cannot be made unless it is known what the membership will be.

Abstracts from Current Medical Literature.

PHYSIOLOGY.

Structural and Functional Organization of the Central Mechanism Controlling Breathing.

ROBERT GESELL, JOHN BRICKER AND CONWAY MAGEE (*American Journal of Physiology*, November, 1936) record a study of the central respiratory mechanism by means of a method of electrical sounding. Their experiments were performed on dogs anæsthetized with morphine and urethane or with "Evipal". The skull cap was resected and in most of the experiments the cerebral hemispheres and portions of the cerebellar vermis were removed by suction. The exposed brain stem was explored for respiratory potentials with two fine insulated needle electrodes, bare at the tips, separated 1·5 to 2·0 millimetres along the longitudinal axis of the animal. The electrodes were connected through amplifiers with a loud speaker for auditory detection and with a General Electric multiple oscillograph for visual inspection and registration of potentials. With graded penetration the loud speaker recorded an ever-changing medley of action sounds, some of which fluctuated with the respiratory rhythm. The authors considered that they could assume with a fair degree of certainty that potentials showing fluctuation in rhythm with respiration were in some way related to respiration. After having completed any set of observations at a single setting of the electrodes, a lesion was placed (to mark the spot) by passing a momentary weak galvanic current across the electrodes at the site of the potentials. The gross position determined by the three-dimensional manipulator insured later positive histological localization. At the close of each experiment the dog was killed, the brain stem was carefully removed and fixed in trichloracetic acid, mercuric chloride and alcohol, embedded in paraffin, and sectioned. The lesions were approximately 0·5 millimetre in diameter. Occasionally they were difficult to find, owing to small hæmorrhages from the rupture of minute blood vessels by the needle electrodes. In such doubtful cases of identification experimental findings were disregarded. Eighty experiments of this type were done. In sixty of these the explorations were confined to the medulla and upper cervical region of the cord between transverse sections 12 millimetres above and several centimetres below the obex. In the remaining twenty the explorations were limited to the thalamus, hypothalamus, mid-brain, pons and medulla above a level eight millimetres on the cephalic side of the obex. A few explorations were made in the cerebellum. "Respiratory potentials" were found in greatest abundance and with greatest certainty in the region about the obex. Explorations of the mesencephalon and diencephalon in twenty experiments revealed only five sets of "respiratory potentials". As might be suspected, respiratory potentials were found at any level of the cord where respiratory muscles were represented. But when the histological sources of these potentials were identified, it was found that potentials arising in the reticular cells ceased at a level approximately two millimetres below the obex. This level may possibly mark the lower limit of the so-called respiratory centre of the medulla. Anatomically it corresponds to the cephalic limit of the pyramidal decussation, the caudal pole of the lateral reticular nucleus of the *medulla oblongata* and a point slightly on the cephalic side of the existing root fibres of the first cervical nerve. The upper limit of the medullary respiratory potentials cuts across the upper quarter of the *nucleus hypoglossus*, the *nucleus ambiguus* and the *nucleus fasciculus solitarius*. These limits are in agreement with findings of many workers localizing the respiratory centre. The incidence of inspiratory potentials was considerably greater than the incidence of expiratory potentials. Three of the five sets of potentials encountered in twenty experiments on higher respiratory centres involved the *brachium conjunctivum*. This suggests a contributing control through the cerebellum. The authors consider that these experiments are of a preliminary nature and are by no means conclusive.

Intrauterine Respiratory Movements of the Fœtus.

FRANKLIN F. SNYDER AND MORRIS ROSENFELD (*American Journal of Physiology*, May, 1937) record an attempt to observe the state of activity of the fœtal respiratory system by a new approach, the chief features of which are the elimination of anæsthetics and the inhibition of labour. In a typical experiment inhibition of labour was accomplished in a rabbit by a single intravenous injection of 100 rat units of pregnancy urine extract, "Antuitrin S" (Parke, Davis and Company), administered on the twenty-fifth day of pregnancy, that is, one week before the end of normal gestation, which occurs usually at thirty-two days. In order to permit laparotomy without the use of a general anæsthetic, the spinal cord of the maternal animal was sectioned at the level of the second lumbar vertebra following infiltration of the superficial tissues with a 1% solution of "Procaine". Incision of the abdomen in the lower mid-line was carried out beneath the surface of a bath of Ringer solution at 37° C. The gravid uterus readily escaped from the peritoneal cavity and came under direct observation still remaining submerged. Any movements of the thorax and abdomen of the fœtus could be clearly distinguished in view of the thinness and translucency of the uterine wall of the rabbit at term, as well as the absence of amniotic fluid, except in minute amounts. At the conclusion of the experiment the litter was delivered and kept under observation in a warm box for forty-eight hours in order to determine any abnormalities. The material upon which observations were based included a total of 56 litters of rabbits which contained 220 fœtuses; 14 litters of cats with 54 fœtuses; and three litters of guinea-pigs with 10 fœtuses. These authors conclude that the first respiration is not initiated at birth. In full-term fœtuses within the uterus the respiratory system is found to be in a state of considerable activity, as shown by the occurrence of regular respiratory movements. Rhythmical excursions of the chest wall and diaphragm continue throughout periods of observation lasting many hours. Certain rhythmical movements of the abdominal wall were traced to the respiratory activity of the fœtus, and in view of this observations were extended to the human being. In six women near term rhythmical fœtal movements were clearly seen for periods of five to ten minutes, occurring at a rate of fifty or sixty per minute. In two women the fœtal respiratory movements were satisfactorily reproduced in a motion picture record. Early in the experiments it was recognized that general anæsthetics profoundly influenced fœtal respiratory movements. After delivery the depressant effect was still clearly evident in the new-born. Respiratory movements set in at birth, but at a rate less than normal. These authors consider that regulation of fœtal respiration depends upon the oxygen and carbon dioxide level of fœtal blood, but differs in certain respects from that of the adult. Oxygen want depresses or abolishes fœtal respiratory movements. Carbon dioxide deficit results in depression or apnœa of the fœtus, showing that a certain level of carbon dioxide is essential for the maintenance of fœtal respiration. An excess of carbon dioxide has little or no effect. The depressant action of anoxæmia seems to be evidence that carotid body mechanism is not functioning in the rabbit fœtus before birth. The rate of respiration of a fœtus varies according to the stage of development, being several times more rapid in postmature than in premature fœtuses.

The Relation Between the Gastric Acidity and the Gastric Bacterial Flora.

BACTERIA are continuously being introduced into the body with the food, but for the most part these organisms are non-pathogenic and apparently exert little or no influence on the body. Sometimes, however, pathogenic organisms are the contaminants and disease may or may

not result. Marion Hood and Lloyd Arnold (*American Journal of Digestive Diseases and Nutrition*, April, 1937) have carried out a series of six experiments to show the relation of the pH of the gastric juice to the bacterial growth of the stomach. All of the experiments were performed on patients in the medical wards of the Research and Educational Hospital of the University of Minois. None of the patients could be considered entirely normal, but those exhibiting any dysfunction of the gastro-intestinal tract or suffering from primary anæmia were not used. Patients showing relatively low gastric acidity were used for many of the experiments. In the first experiment aspirations by means of Rehfuss tubes were made from the fasting stomachs of 106 patients. The pH was determined colorimetrically, and bacterial growth was determined by plating out one standard loop of material on the surface of plain agar. Although there were a few discrepancies, it was found that when the pH was less than 1·0 the gastric contents were sterile; when the pH was between 1·0 and 2·0 an occasional colony appeared; a pH of 3·0 marked the borderline of bacterial growth; when the pH was above 3·0 a heavy bacterial growth occurred. In the second experiment the observations were extended over a period of three and a half hours in five patients. The variation in pH during this period was associated with a parallel change in the bacterial flora. The third and fourth series of experiments showed that the alterations in the pH of the gastric contents produced by the ingestion of dilute mineral acids were associated with a decrease of the viable bacterial flora. The ingestion of buffered alkaline solutions were associated with increase in the viable bacterial flora. The fifth and sixth experiments showed that the addition of 50 cubic centimetres of a 1% solution of hydrochloric acid to the fasting stomach produced a retention of free acid for approximately one and a half hours. This period was reduced to somewhat less than one hour if food was ingested.

BIOLOGICAL CHEMISTRY.

Vitamin B_1 in Breads.

THE results of investigations of the vitamin B_1 content of white and brown breads have been reported by Leslie Julius Harris (*Biochemical Journal*, May, 1937). The assays were performed by the bradycardia technique on rats. A proprietary "germ bread" (prepared from a mixture of three parts of white flour *plus* one part of treated wheat germ) was found to be very little superior to ordinary wholemeal bread, although it was seven to eight times more potent than white bread. "Bran bread" (brown bread containing the branny matter with only a minimum amount of germ) was superior to white bread, but not greatly inferior to wholemeal bread (bread containing the bran *plus* the small proportion of germ present in the original wheat). These results were confirmed in later work by Peng Chong Leong and Leslie Julius Harris (*Biochemical Journal*, May, 1937) by similar studies of vitamin B_1 content of flours from which the breads were made.

Retention of Orally Administered Iron.

JOHN FLEMING BROCK AND DONALD HUNTER (*Quarterly Journal of Medicine*, January, 1937) report the results of balance experiments on the retention of orally administered iron in human subjects. It was found that when large doses of iron and ammonium citrate or of Blaud's pill were given, large amounts of iron were retained. The amount of retained iron was found to be much greater than has been inferred from the rate of hæmoglobin response after iron therapy in iron deficiency anæmia. It is considered that these results throw doubt on the inference that large therapeutic doses of iron are necessary because only small quantities are absorbed and retained.

Determination of Magnesium in Serum.

WILLIAM S. HOFFMAN (*Journal of Biological Chemistry*, March, 1937) has described a new colorimetric method for the determination of magnesium in serum. Magnesium is precipitated with 8-hydroxyquinoline, and the hydroxyquinoline is estimated by measuring the green-blue colour that it forms with ferric ions in weak hydrochloric acid.

Gastric Acidity in Alcohol Addicts.

PHILIP M. JOFFE AND NORMAN JOLLIFFE (*The American Journal of the Medical Sciences*, April, 1937) have studied the gastric acidity in 105 chronic alcohol addicts. Some patients had no complications, while others showed polyneuritis and pellagra. The alcohol test meal was used and histamine was administered if free acid was absent from the first three samples. The authors conclude that alcohol *per se* does not cause achlorhydria in the alcohol addict, and suggest that an achlorhydria-preventive factor may be present in the vitamin *B* complex.

Prevention of Cataract in the Rat by Flavine.

PAUL L. DAY, WILLIAM J. DARBY AND WILLIAM C. LANGSTON (*Journal of Nutrition*, April, 1937) fed young rats on a diet deficient in flavine. Growth ceased and death supervened in all cases. Alopecia and cataract were exhibited, but no dermatitis was observed. When supplements of flavine were added to the basal diet, good growth occurred and there were no evidences of cataract. The authors conclude that, in the rat, flavine has a specific activity in the prevention of cataract.

Estimation of Anæsthetic Gases in Blood.

F. S. ORCUTT AND R. M. WATERS (*Journal of Biological Chemistry*, February, 1937) have described a method for the estimation of cyclopropane, ethylene and nitrous oxide in blood, and of carbon dioxide and oxygen in the presence of these gases. The determinations are carried out in the Van Slyke-Neill manometric apparatus.

Choline Esterase Activity in Nervous Diseases.

HENRY TOD AND M. S. JONES (*Quarterly Journal of Medicine*, January, 1937) have investigated the choline esterase activity in the blood serum of 203 patients with various types of nervous and mental disorders. A statistically significant rise was found in the anxiety states, and a significant fall in the catatonic stupors and in epilepsy.

The Antipellagra Factor.

THE further purification of the antipellagric vitamin has been described by C. J. Koehn and C. A. Elvehjem (*Journal of Biological Chemistry*, May, 1937). The authors consider it probable that the factor responsible for the prevention of pellagra in man is identical with that which prevents black tongue in the dog and the pellagra-like symptoms in chickens. It is suggested that this concentrate should be highly effective in the treatment of human pellagra, since it is a potent source of the vitamin curative of canine black tongue and preventive of the pellagra-like symptoms in chickens.

Dietary Deficiency as a Cause of Macrocytic Anæmia.

JUDA GROEN AND ISIDORE SNAPPER (*The American Journal of the Medical Sciences*, May, 1937) have recorded observations on two patients exhibiting macrocytic anæmia which resembled pernicious anæmia except in the fact that free hydrochloric acid, in small amounts, was present in the gastric juice. In one case recovery induced by liver extract was maintained for six years on a complete diet without further liver treatment. In the other case complete recovery was produced and maintained by a mixed diet *plus* autolysed yeast, with no liver treatment. It is suggested that the anæmia was due to a deficiency of Castle's extrinsic factor rather than of the intrinsic factor.

British Medical Association News.

ANNUAL MEETING.

THE annual meeting of the South Australian Branch of the British Medical Association was held in the Anatomy Theatre, University of Adelaide, on June 23, 1937, DR. A. F. STOKES, the President, in the chair.

Annual Report of Council.

The annual report of the Council was received and adopted on the motion of Dr. L. C. Lindon, seconded by Dr. R. J. Verco. The report is as follows.

Election.

At the annual meeting held last June officers and members were elected as follows:

President: A. F. Stokes.

Vice-President: R. E. Magarey.

Honorary Medical Secretary: C. B. Sangster.

Honorary Treasurer: F. St. John Poole.

Ordinary Members of Council: P. T. S. Cherry, E. F. Gartrell, O. M. Moulden, C. F. Pitcher.

At the first meeting of the Council, held on July 2, the following subcommittees were appointed:

Scientific: President, E. F. Gartrell, R. E. Magarey, O. M. Moulden, C. F. Pitcher, C. B. Sangster, C. Yeatman.

Contract Practice: President, D. R. W. Cowan, P. T. S. Cherry, F. St. John Poole, C. F. Pitcher, C. Yeatman.

Library: President, Sir Henry Newland, E. F. Gartrell, R. E. Magarey, C. B. Sangster.

Parliamentary Bills: President, P. T. S. Cherry, R. E. Magarey, O. M. Moulden, F. St. John Poole, Bronte Smeaton. The following were subsequently added: D. R. W. Cowan, E. Britten Jones.

Revision of Rules: Sir Henry Newland, Bronte Smeaton; E. Britten Jones subsequently added.

Ethical: President, Sir Henry Newland, D. R. W. Cowan, P. T. S. Cherry, R. E. Magarey, F. St. John Poole, Bronte Smeaton, C. B. Sangster, C. Yeatman; E. Britten Jones subsequently added.

Meetings.

The Council.—The Council has met on 14 occasions, the attendances being:

D. R. W. Cowan	11	F. St. John Poole	14
P. T. S. Cherry	13	C. F. Pitcher	14
E. F. Gartrell	14	C. B. Sangster	14
E. Britten Jones	8	G. Wien Smith	12
O. M. Moulden	12	A. F. Stokes	14
R. E. Magarey	13	Bronte Smeaton	3
Sir Henry Newland	13	C. Yeatman	13

Scientific Subcommittee.—The Scientific Subcommittee met on two occasions, the attendance being:

E. F. Gartrell	2	C. B. Sangster	2
R. E. Magarey	2	A. F. Stokes	2
O. M. Moulden	2	C. Yeatman	2
C. F. Pitcher	2		

Contract Practice Subcommittee.—The Contract Practice Subcommittee met on two occasions, the attendance being:

D. R. W. Cowan	2	F. St. John Poole	2
P. T. S. Cherry	2	A. F. Stokes	2
C. F. Pitcher	2	C. Yeatman	1

Library Subcommittee.—The Library Subcommittee met on two occasions, the attendance being:

E. F. Gartrell	2	C. B. Sangster	2
Sir Henry Newland	2	A. F. Stokes	1
R. E. Magarey	2		

Ethical Subcommittee.—The Ethical Subcommittee met on two occasions, the attendance being:

D. R. W. Cowan	2	F. St. John Poole	2
P. T. S. Cherry	1	B. Smeaton	1
E. Britten Jones	1	C. B. Sangster	2
R. E. Magarey	1	A. F. Stokes	2
Sir Henry Newland	2	C. Yeatman	1

Parliamentary Bills Subcommittee.—The Parliamentary Bills Subcommittee met on two occasions, the attendance being:

P. T. S. Cherry	2	O. M. Moulden	2
D. R. W. Cowan	1	F. St. John Poole	2
E. Britten Jones	1	Bronte Smeaton	1
R. E. Magarey	2	A. F. Stokes	2

Monthly General Meeting.

Nine scientific meetings were held. Interest was well maintained and the attendances satisfactory. The country meeting in September was held at Clare. The thanks of the Council are tendered to Dr. G. Wien Smith and Dr. J. C. Sangster, who helped to make the meeting a success.

The following programme was carried out during the year:

1936—

July.—Demonstration by I. B. Jose and A. L. Dawkins: "The Treatment of Fractures of the Lower Leg". (Discussion opened by L. O. Betts.)

August.—Paper by J. E. Bateman: "Some Aspects of Medical Practice During Twenty Years in Egypt" (illustrated). (Discussion opened by E. Britten Jones.)

September.—Papers by H. M. Jay and R. Thorold Grant: "Infection of Upper Respiratory Tract in Children".

October.—Paper by T. G. Wilson: "Some Remarks on Ante-Natal Supervision". Paper by Brian Swift: "Some Remarks on Analgesia in Childbirth".

November.—Clinical evening at the Tuberculosis Clinic, Adelaide Hospital.

1937—

February.—Paper by E. F. West on "Fractures About the Elbow Joint". (Discussion opened by N. S. Gunning.)

March.—Paper by K. S. Hetzel: "Precordial Pain". (Discussion opened by Guy Lendon.)

April.—Paper by F. H. Beare: "Peptic Ulcer". (Discussion opened by Ian Hamilton.)

May.—Listerian Oration by S. V. Sewell, of Melbourne: "The Problem of Cerebral Localization in the Light of Modern Work".

Listerian Oration.

The oration this year was delivered by Dr. S. V. Sewell, of Melbourne, on May 14, his subject being "The Problem of Cerebral Localization in the Light of Modern Work". The Council desires to record its sincere thanks to Dr. Sewell for his brilliant oration. At the close of the meeting members were invited to supper in the refectory by the President.

Membership.

The membership of the Branch is 372, an increase of nine on the previous year. The number of new members elected was 17, the balance representing the difference between transfers "in and out".

It is with deep regret that we record the death of the following members: H. P. Brownell, C. E. Dolling, J. E. Formby, B. H. Morris, J. P. O'Brien.

Representation on Boards.

Dental Board.—L. C. E. Lindon.

Work of Sections.

Eye, Ear, Nose and Throat Section.—Five meetings were held during the year, the attendance being satisfactory.

Surgery.—The membership is 49, and an average attendance of 23 members attended the three meetings held.

History of Medicine.—Three meetings were held during the year.

Clinical Medicine.—Membership of this section is 70. Five meetings were held during the year, the average attendance being 26, an increase of seven on the previous year.

During the year the Council gave consideration to the rules laid down for the working of the sections, with a view to increasing their efficiency, more particularly in regard to the financial arrangements. It was felt that if all subscriptions were collected through the office of the Branch a more satisfactory result would be obtained. Representatives of the Council met the honorary secretaries of the sections in conference, as a result of which it has been decided that the collection of the subscriptions for the sections be undertaken by the Lay Secretary, also that all sections will end their year on October 30, thus securing uniformity in the forwarding of annual reports to the Council, as provided for in the "Rules for Sections". The above will come into force from the end of the present year.

Lodge Practice.

In order to afford some relief to lodge members during the depression, a reduction of 1s. 6d. per quarter in the family lodge medical fee was made, and the age at which juveniles could remain on the juvenile medical list was altered from 16 to 18 years. Although this arrangement was made for one year only, it has remained in force for some time. During the year the Council felt that the time was opportune for the restoration of the original conditions in regard to these matters under the Lodge Agreement, and gave notice to the lodges accordingly. The fee for family lodge attendance has therefore been restored to 10s. 6d. per quarter, and the age at which juveniles can remain on the surgeon's juvenile list is 16 years. Attention was also given to the list of members supplied to lodge surgeons, and lodges have been requested to supply new and up-to-date lists to lodge surgeons.

Adelaide Permanent Post-Graduate Committee.

In view of the Australasian Medical Congress (British Medical Association) to be held at Adelaide, August 23 to 28, 1937, the committee decided not to hold the annual post-graduate course this year. Arrangements, however, were made for Professor J. C. Meakins to deliver three lectures on May 17, 18 and 19. During the year the Council approached the University Council with the idea of the Post-Graduate Committee and the University being more closely associated with the post-graduate work in medicine, and negotiations are still proceeding with this in view.

Revision of Rules.

After correspondence between the Parent Association and the solicitors for the Branch, the new rules and by-laws have now been completed. Members will be called together shortly to adopt same, after which the Association will be incorporated under the *Associations Incorporation Act.*

Australasian Medical Congress (British Medical Association), Fifth Session, 1937.

The General Committee of Congress has met on two occasions to receive reports from the Executive Committee, which has met regularly twice a month and has done a vast amount of work. Arrangements are well in hand; sections and programmes have been formed; accommodation and transport secured. Many entertainments have been arranged, the Branch itself being responsible for the congress ball. It only remains for the members of the Branch to give their whole-hearted support and the congress should be an unqualified success.

Emergency Treatment to Persons Injured Through Road Accidents.

The *Road Traffic Act*, 1934, was assented to on December 3, 1936. The act provides for payment to medical practitioners for emergency treatment in respect of bodily injury (including fatal injury) to any person caused by or arising out of the use of a motor vehicle. Although it is understood that some claims made by medical practitioners under the act have been disallowed by insurance companies, the Council is making inquiries, and members will be advised later regarding this matter.

Federal Council.

Dr. Bronte Smeaton resigned as one of our representatives in December last. Dr. Smeaton had served as a member of the Federal Committee and subsequently of the Federal Council since 1924. At a meeting of the Branch Council held November 5 it was decided to place on record the appreciation of the Branch for the valuable service rendered by Dr. Smeaton. Dr. E. Britten Jones was elected to fill the vacancy on the Federal Council caused by the retirement of Dr. Smeaton.

Two meetings of the Federal Council were held during the year, the first being held at Melbourne on September 7, 1936, at which Sir Henry Newland and Dr. Bronte Smeaton attended. The second meeting was held at Melbourne on February 7, 1937, Sir Henry Newland and Dr. E. Britten Jones attending.

Honours to Members.

The Council tenders its congratulations to Sir Stanton Hicks, S. L. Dawkins, O.B.E., also to Sir Henry Newland, who has been awarded the Gold Medal of the British Medical Association in Australia.

Home for the Branch.

During the year the British Medical Hall Company Limited formulated a scheme for the building of a home for the Branch on the land owned by the company on North Terrace. The scheme was submitted to the Council, who decided to refer it to the members of the Branch at a special general meeting in order to ascertain if members would be agreeable to an increase in the annual subscription, which is necessary to provide the rent for the accommodation provided. The members, however, negatived the proposal until the matter has been further considered.

National Insurance.

At the invitation of the Federal Ministry, two British experts visited Australia to advise the Federal Government in regard to national insurance. Their report is not yet available, but the matter is being closely watched by the Federal Council.

Formation of Special Associations within the Association.

The Federal Council has drawn up rules and by-laws relating to the formation of special groups of members having distinctive professional interests. Members of the Branch will have the rules and by-laws placed before them at a general meeting for adoption, when provision will be made for inclusion in the Articles of Association of the Branch.

Mental Defectives Act.

The Council has had under consideration the *Mental Defectives Act* and forwarded to the Government certain amendments considered necessary in the public interest in order to bring mentally defective patients in South Australia under the same conditions as those existing in Great Britain. A deputation from the Council waited on the Chief Secretary to place the recommendations contained in the report before him, and they are being considered by the Government.

Association Clearing House for Payments to Lodge Surgeons.

The advisability of establishing a clearing house at the office of the Branch for handling the payments made by the lodges to lodge surgeons has been further considered. It is felt that such a scheme would be in the interests of lodge surgeons, and it is intended to call a meeting shortly to consider the matter.

Representation on the Central Council of the Association.

Sir Thomas Dunhill having resigned as Group Representative of Victoria, South Australia, Tasmania and Western Australia on the Central Council of the Association, Dr. Isaac Jones has been elected in his place.

General Remarks.

Much good work has been accomplished during the past year, and the interests of members have been safeguarded as far as possible. There have been many important questions before the Council, and some are still under consideration. Early in the new year the Branch will be incorporated, thus making it possible to widen the scope of its activities.

The Council would like to call the attention of members to the necessity for supporting the Medical Benevolent Association of South Australia to enable it to be in a better position to afford help to those who need it.

In conclusion, I wish to thank the members of Council for their loyal support during the year, and the Lay Secretary for his untiring efforts on behalf of the Branch, and particularly for his very great help to me personally.

(Signed) A. F. STOKES,
President.

Financial Statements.

The financial statements were presented by the Honorary Treasurer, Dr. F. St. John Poole, and adopted. The financial statements are published herewith.

Introduction of President.

Dr. A. F. Stokes then introduced the President for the ensuing year, Dr. R. E. Magarey, and invested him with the collar of his office.

Dr. Magarey thanked the members for his election and assured them that he would do all in his power to forward the interests of the Branch.

Balance Sheet as at December 31, 1936.

LIABILITIES.	£ s. d.	£ s. d.
To Subscriptions paid in advance ..		5 2 0
„ British Medical Association, London—		
Paid Subscriptions	63 9 0	
Unpaid Subscriptions	48 9 0	
		111 18 0
„ THE MEDICAL JOURNAL OF AUSTRALIA—		
Paid Subscriptions	48 0 0	
Unpaid Subscriptions	38 0 0	
		86 0 0
„ Library Fund		504 5 1
„ Sundry Creditors		8 0 10
„ General Fund		2,906 17 2
		£3,622 3 1

ASSETS.	£ s. d.	£ s. d.
By Plant and Fittings	95 19 9	
Less Depreciation	8 0 0	
		87 19 9
„ British Medical Hall Company Limited, Share Account		2,060 0 0
„ Library Fund—		
Delineascope	33 0 0	
Projector	46 16 0	
	79 16 0	
Less Depreciation	8 0 0	
		71 16 0
„ Savings Bank Library Fund ..		160 8 1
„ Lister Medals and Dies		17 13 4
„ British Medical Hall Company Limited, Loan Account		450 0 0
„ Subscriptions Owing		280 13 7
„ Stocks—		
Hospital Forms	0 15 7	
Medical Certificate Books ..	3 2 3	
Stationery	10 0 0	
		13 17 10
„ British Medical Hall Company Limited	178 14 6	
„ Sundry Debtors	7 7 1	
		186 1 7
„ Medical Defence Association ..		10 0 0
„ Cash—		
Savings Bank of South Australia	32 6 1	
Commonwealth Savings Bank .	99 5 7	
National Bank of Australasia Limited	122 19 11	
In Hand	29 1 4	
		283 12 11
		£3,622 3 1

I certify that I have examined the books and vouchers of the British Medical Association as produced to me for the year ended December 31, 1936, and that in my opinion the above Balance Sheet correctly sets forth the financial position of the Association as at the above date and as shown by the books.

Adelaide,
May 3, 1937.

C. W. L. MUECKE,
Chartered Accountant (Aust.),
Auditor.

Income and Expenditure for Year ended December 31, 1936.

	£ s. d.	£ s. d.
To British Medical Association, London	465 8 3	
„ THE MEDICAL JOURNAL OF AUSTRALIA	349 10 0	
		814 18 3
„ Library Subscriptions		61 0 0
„ Rent	45 19 0	
„ Telephone	34 5 9	
„ Stationery and Printing	30 4 9	
„ Postages and Telegrams	23 15 1	
„ Exchange	1 14 3	
„ General Expenses	59 5 10	
		195 4 8
„ Lister Medal		0 10 0
„ Salary		350 0 0
„ Federal Council		32 18 0
„ Depreciation		8 0 0
„ Balance		48 14 10
		£1,511 5 9

	£ s. d.	£ s. d.
By City Subscriptions	950 4 6	
„ Country Subscriptions	397 8 6	
„ Accrued Subscriptions	155 11 0	
		1,503 4 0
„ Interest		4 16 0
„ Accrued Interest		3 1 6
„ Medical Certificate Books		0 4 3
		£1,511 5 9

Library Fund Account, December 31, 1936.

	£ s. d.	£ s. d.
To Adelaide University	50 0 0	
„ Depreciation	8 0 0	
„ Balance	504 5 1	
	£562 5 1	
By Balance brought down, December 31, 1935		499 3 1
„ Interest from Savings Bank		2 2 0
„ Transfer from Income and Expenditure Account		61 0 0
		£562 5 1

General Fund Account.

	£ s. d.	£ s. d.
To Balance	2,906 17 2	
	£2,906 17 2	
By Balance brought down, December 31, 1935		2,858 2 4
„ Income and Expenditure Account		48 14 10
		£2,906 17 2

Election of Office-Bearers.

Office-bearers for the ensuing twelve months were elected as follows:

Vice-President: Dr. P. T. S. Cherry.
Honorary Medical Secretary: Dr. C. B. Sangster.
Honorary Treasurer: Dr. F. St. John Poole.
Members of Council: Dr. R. Burston, Dr. M. Erichsen, Dr. F. Ray Hone.

Retiring President's Address.

Dr. A. F. Stokes, the retiring President, delivered his address (see page 161).

Votes of Thanks.

A vote of thanks was accorded to Dr. Stokes for his address on the motion of Dr. P. T. S. Cherry, seconded by Dr. K. Steele; votes of thanks were also passed to Dr. C. Yeatman and Dr. G. Wien Smith, retiring members of the Council, on the motion of Dr. P. S. Messent, seconded by Dr. G. H. Burnell.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Richardson, Kenneth Stephen, M.B., B.S., 1931 (Univ. Sydney), 263, Rocky Point Road, Ramsgate.

The undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Burfitt, Walter Furneaux, M.B., B.S., 1927 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Cumpston, Howard Bruce, M.B., B.S., 1936 (Univ. Sydney), Western Suburbs Hospital, Croydon.

Fitzgerald, Charles Edward, M.B., 1929 (Univ. Sydney), 229, Maroubra Bay Road, Maroubra.

Gill, Robert Chalmers, M.B., B.S., 1937 (Univ. Sydney), Sydney Hospital, Sydney.

Godfrey, Margaret A. H., L.R.C.P., L.R.C.S., 1936 (Edinburgh), L.R.F.P.S., 1936 (Glasgow), Sydney Sanitarium and Hospital, Wahroonga.

Gordon, Neil Acheson, M.B., 1933 (Univ. Sydney), Pacific Highway, Belmont.

Hiatt, Leslie Parker, M.B., 1933 (Univ. Sydney), 30, Lyons Road, Drummoyne.

Malouf, Naaman George, M.B., B.S., 1934 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Boyd, George, L.R.C.P., L.R.C.S., L.R.F.P.S., 1935 (Edinburgh), Corrimal.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

Programme of the Sections.

THE following subjects will be discussed at meetings of the several sections of the Australasian Medical Congress (British Medical Association) to be held at Adelaide on August 23 to 28, 1937.

Section of Medicine.—"A Survey of Syphilis" (presidential address); "Modern Treatment of Syphilis in its Relation to Hepatic Function in Health and Disease"; "Treatment of Peptic Ulcer" (with Section of Surgery and Section of Radiology); "Prognosis of Coronary Thrombosis"; "Treatment of Pyelitis"; "Pulmonary Tuberculosis and Marriage" (with Section of Public Health and Preventive Medicine and Section of Obstetrics and Gynæcology); "Indications for the Use of Blood in Transfusion"; "Disorders of the Pituitary Gland in Relation to Metabolic and Circulatory Disturbances"; "Some Results Achieved by Tuberculin Therapy".

Section of Oto-Rhino-Laryngology.—Presidential address; "Neoplasms of the Larynx"; "Short Wave Therapy in Sinus Disease"; "Prophylaxis of Antral Infections"; "Carcinoma of the Œsophagus" (with the Section of Radiology); "Brain Abscess" (with the Section of Neurology and Psychiatry); "Post-Nasal Sinusitis"; "Tuberculosis of the Larynx".

Section of Pædiatrics.—"Acute Abdominal Conditions in Infancy and Childhood" (presidential address); "Asthma"; "Infantile Eczema" (with the Section of Dermatology); "Raw Apple Diet in Diarrhœa of Children"; "Tuberculosis of the Hip Joint" (with the Section of Orthopædic Surgery); "The Management of Cases of Rheumatic Heart Disease" (with the Section of Public Health); "The Unsatisfactory Child".

Section of Naval, Military and Air Force Medicine and Surgery.—"The Physical Efficiency of Recruits for the New Zealand Permanent Forces" (presidential address); "Certain Suggested Improvements in First Aid Training".

Section of Orthopædic Surgery.—Presidential address, "Tuberculosis of the Hip Joint" (with the Section of Pædiatrics); "Low Back Pain: Sacro-Iliac and Lumbo-Sacral Conditions"; discussion on abnormal conditions of the feet.

Section of Radiology.—"Twenty-Nine Years of X Ray Work" (presidential address); "Peptic Ulcer" (with the Section of Medicine and the Section of Surgery); "Carcinoma of the Œsophagus" (with the Section of Oto-Rhino-Laryngology); "Renal Tuberculosis" (with the Section of Surgery); "Gastroscopy with a Flexible Gastroscope"; demonstration of interesting films; discussion on intravenous urography; discussion on investigation of the small and large intestine.

Section of Pathology, Bacteriology and Experimental Medicine.—"Newgrowths of the Breast, with Special Reference to Precancerous Conditions" (presidential address); "Some Modern Phases of Laboratory Diagnostic Methods"; "Certain Modern Agents for the Detection and Abolition of Susceptibility to Diphtheria"; "The Tubercle Bacillus and Cancer of the Alimentary Tract and Prostate"; "Diphtheria Immunization" (with the Section of Public Health); "The Types of Corynebacterium Diphtheriæ Prevalent in Victoria and their Clinical Significance"; "Fevers of South Queensland, Including 'Q' Fever, Leptospirosis and Rat-Bite Fever"; "Ten Thousand Blood Counts, with Special Reference to Idiopathic Microcytic Anæmia"; "Some Pathological Problems Arising in Connexion with a Cancer Clinic"; "Records of Helminthic Infections of Man in Australasia"; "Periarteritis Nodosa"; "The Pathology of the Liver and Spleen"; "The Fibro-Fatty Liver"; "Early Manifestations of Vitamin A Deficiency".

Section of Medical Literature and History.—"The Development and the Study of the History of Medicine" (presidential address); "The History of Tuberculosis in New Zealand"; "Some Notes on the Early History of Tuberculosis"; "Robert Koch"; "The Coming of Medicine to Tasmania: Early Medical Practitioners and their Environment"; "History of the Central Board of Health in South Australia"; "Biographies of Two Early Medical Practitioners of South Australia"; "Medical Names in Australian Zoological Nomenclature"; "The First Fifty Names on the Medical Register of South Australia"; "Some Early References to Tuberculosis in Australia"; "The Turbulent Dr. Lhotsky"; "Dr. George Bennett, Naturalist and Physician".

Section of Public Health, Preventive Medicine and Tropical Hygiene.—Presidential address; "Statistical Paper Dealing with the Ætiology and Progress of Industrial Pulmonary Disease and its Relation to Tuberculosis"; "Relationship of Lead Absorption to Nephritis and its Incidence in Australia"; "The Problems Involved in the Supervision of Air Traffic from Overseas with its Attendant Risks"; "Tuberculin, Schick and Dick Tests in Central New Guinea Natives"; "Diphtheria Immunization" (with the Section of Pathology); "Mafriage and Tuberculosis" (with the Section of Medicine and the Section of Obstetrics and Gynæcology); "Tuberculosis Control in South Australia"; "Observations on Morbidity in North Queensland"; "Some Problems in Leptospirosis in Australia"; "Investigation into Tropical Typhus in North Queensland"; "Juvenile Rheumatism"; "A Statistical Nutrition and Health Study of Victorian School Children"; "A Nutritional Survey of the Interior of South Australia and Queensland.

Section of Obstetrics and Gynæcology.—Presidential address; "Puerperal Infection by Hæmolytic Streptococci"; "Sterility"; "Carcinoma of the Cervix Uteri from the General Practitioner's Viewpoint"; "Pulmonary Tuberculosis and Marriage" (with the Section of Medicine and the Section of Public Health and Preventive Medicine); "Acute Puerperal Inversion of the Uterus"; "Anæsthesia in Labour"; "Indications for Interference in Labour"; "Methods of Induction of Labour"; demonstrations.

Section of Dermatology.—Presidential address; "Lupus Vulgaris and the Significance of the Relationship of Certain Non-Specific Dermatoses to Tuberculosis"; "Infantile Eczema" (with the Section of Pædiatrics); "Treatment of Hæmangiomata".

Section of Anæsthesia.—"The Present Status of Anæsthesia and Anæsthetists" (presidential address); "Anæsthesia in Pulmonary Tuberculosis"; "Cyclopropane Anæsthesia"; "Statistical Survey of Deaths Under Anæsthesia".

Section of Neurology and Psychiatry.—"Pathological and Psychological Aspects of Insanity"; "Circulatory Lesions of the Brain Brought out by the Microscope"; "The Pathology and Treatment of Syringomyelic Cavities"; "The Multiplicity of the Encephalitides"; "The Clinical Course of Tuberculous Meningitis"; "Psychiatry of the School Period"; "Results of the Investigation of Reflex Epilepsy"; "How Civilization Manufactures Neuroses"; "Cerebral and Cerebellar Abscess" (with the Section of Oto-Rhino-Laryngology); "Surgical Anatomy of the Lumbo-Sacral Sympathetic and the Effects of Sympathetic Denervation of the Lower Limbs in Vascular Disorder"; "Papilloedema: Its Pathology and Effect upon Vision and its Significance in Neurology" (with the Section of Ophthalmology); "Pathogenesis and Treatment of Subacute Combined Degeneration of the Cord"; "The Treatment of Trigeminal Neuralgia"; "Some Aspects of Post-Operative Management in Neuro-Surgery".

Section of Surgery.—"The General Principles Governing Surgical Intervention in Tuberculosis"; "Peptic Ulcer" (with the Section of Medicine and the Section of Radi-

ology"; "Management of Large Umbilical Hernia"; "Incisional Hernia"; "Renal Tuberculosis" (with the Section of Radiology); "Gastroscopy and its Value in the Diagnosis of Peptic Ulcers"; "Strangulated Hernia, with Results Over Twenty-One Years at Dunedin Public Hospital"; "The Use of Drip Saline in Surgery"; "Fracture of the Pelvis"; "Traumatic Rupture of the Urethra and its Treatment"; "Undescended Testes".

Section of Ophthalmology.—Presidential address; "Occupational Diseases and Injuries of the Eyes and Workers' Compensation"; "Diagnosis of Tuberculous Eye Disease"; "The Retina of the Australian Mammal"; "The Future of Ophthalmology in Australia"; "Some Aspects of Ocular Conditions in Diabetes"; "Recurring Problems in Ophthalmic Practice"; "New Endocrine Manifestation of the Cornea and Conjunctiva"; "Reactionary Hæmorrhage Following Blows on the Eye"; "Papilloedema: Its Pathology and Effect upon Vision and its Significance in Neurology" (with the Section of Neurology and Psychiatry).

Public Health.

POLIOMYELITIS IN VICTORIA.

A MEETING of the medical committee controlling the joint government and municipal campaign against poliomyelitis was held on July 16, 1937.

After consideration of a report by Dr. Mostyn L. Powell, medical officer to the committee, regarding his investigation of the treatment of poliomyelitis and the value of serum in such treatment *et cetera*, and of the present epidemic of poliomyelitis in the Ormond, Caulfield and Moorabbin area, the committee decided to make the following statements for publication in the Press:

At the present time there is very great doubt among world authorities as to the value of convalescent serum in the treatment of poliomyelitis as hitherto and at present employed. This doubt is supported by experience in the present epidemic. Serum, however, is at least harmless and, as there is no other form of treatment available, and it is possible that a more potent serum may be developed, the committee feels that the collection of serum should be continued until more definite knowledge is available.

In regard to the use of nasal sprays, the committee feels that, in view of the inconclusive results of a trial of the picric acid-alum spray in a large epidemic in America, it is not yet in a position to recommend the general use of such a spray. Any persons who wish to adopt this method should do so under medical advice.

This committee considers that the intramuscular injection of citrated blood from parents to children who are known to have been in contact with a case may help to avert an attack and would be harmless.

General quarantine cannot be applied without stopping all social life.

Closure of schools can be a useful measure only if parents ensure that their children are strictly isolated in their homes for at least one month.

Correspondence.

MALARIA AND ITS TREATMENT BY THE GENERAL PRACTITIONER.

SIR: Let me assure Dr. Finckh that I did not overlook the footnote to his paper. Perhaps, if Professor Nocht had written the paper himself, I should still have been bold enough to comment on it.

My opinion of the synthetic antimalarial drugs is based partly on my own experience of them and partly on my study of the literature. Of the two sources of information experience is the more valuable.

Nobody appreciates more than I the value of "following in the footsteps of those great men who have blazed the trail"; but there have been many great men and there are many trails. One cannot follow them all. One might fare best if he ascertained the general direction in which they led, then set a compass course on his own reckoning.

Finally, sir, I would say that Dr. Finckh's courteous and gentle rebuke finds me still unchastened.

Yours, etc.,

Sydney, July 20, 1937. W. L. CALOV.

THE ADELAIDE CONGRESS: SECTION OF RADIOLOGY.

SIR: One session of the section is to be devoted to the exhibition of interesting X ray films, and it is hoped that members of the section will contribute to this demonstration without further invitation.

Subjects to be discussed at the meetings of the section will include "Peptic Ulcer", "Renal Tuberculosis", "Carcinoma of the Œsophagus", and "Intravenous Urography".

Members are invited to contribute to the discussion on these subjects.

Yours, etc.,

H. A. McCOY,
Honorary Secretary,
Section of Radiology.

178, North Terrace,
Adelaide,
July 13, 1937.

Obituary.

HANS DIETRICH NOBBE.

WE regret to announce the death of Dr. Hans Dietrich Nobbe, which occurred on July 19, 1937, at Tenterfield, New South Wales, as the result of a motor car accident.

Hans Nobbe became known to many medical practitioners in Australia as Director of Bayer Pharma, Limited. His obvious integrity gained him the respect of all with whom he became associated. Born in 1899 at Elberfeld, Germany, he volunteered for service in the field at the age of seventeen and served with the German artillery. After the War he identified himself with the National Socialist Party. He made in Australia many friends, who will regret his untimely death.

ALAN NEIL YUILLE.

WE regret to announce the death of Dr. Alan Neil Yuille, which occurred on July 21, 1937, at Sydney, New South Wales.

Proceedings of the Australian Medical Boards.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts*, 1925 to 1935, of Queensland, as duly qualified medical practitioners:

Michel, Max, L.R.C.P. and S., 1936 (Edinburgh), L.R.F.P. and S., 1936 (Glasgow), Brisbane.

Morton, Alfred John, M.B., B.S., 1935 (Univ. Sydney), Mackay.

Putland, Vincent Malcolm, M.B., 1932 (Univ. Sydney), Toowoomba.

Books Received.

MATERIA MEDICA. PHARMACY, PHARMACOLOGY AND THERAPEUTICS, by W. Hale-White, K.B.E., M.D., LL.D., revised by A. H. Douthwaite, M.D., F.R.C.P.; Twenty-Third Edition; 1937. London: J. and A. Churchill Limited. Crown 8vo, pp. 574. Price: 10s. 6d. net.

CATECHISM SERIES. BOTANY, PART II; Fourth Edition, completely rewritten and revised; 1937. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 164. Price: 1s. 6d. net.

Diary for the Month.

AUG. 3.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 3.—Tasmanian Branch, B.M.A.: Council.
AUG. 4.—Victorian Branch, B.M.A.: Branch.
AUG. 4.—Western Australian Branch, B.M.A.: Council.
AUG. 5.—South Australian Branch, B.M.A.: Council.
AUG. 6.—Queensland Branch, B.M.A.: Branch.
AUG. 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 10.—Tasmanian Branch, B.M.A.: Branch.
AUG. 13.—Queensland Branch, B.M.A.: Council.
AUG. 17.—Tasmanian Branch, B.M.A.: Council.
AUG. 17.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 18.—Western Australian Branch, B.M.A.: Branch.
AUG. 19.—New South Wales Branch, B.M.A.: Clinical meeting.
AUG. 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 25.—Victorian Branch, B.M.A.: Council.
AUG. 26.—New South Wales Branch, B.M.A.: Branch.
AUG. 26.—South Australian Branch, B.M.A.: Branch.
AUG. 27.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. M. M. Haslam has been appointed Honorary Anæsthetist at the Adelaide Hospital, Adelaide, South Australia.

* * *

Dr. C. J. McTeigue has been appointed Certifying Medical Practitioner at Traralgon, Victoria, pursuant to the provisions of the *Workers' Compensation Acts*.

* * *

Dr. E. McDonald has been appointed, pursuant to the provisions of the *Workers' Compensation Acts*, Certifying Medical Practitioner at Bacchus Marsh and Melton, Victoria.

* * *

Dr. M. A. Rees has been appointed Certifying Medical Practitioner and Medical Referee at Oakleigh, Victoria, in accordance with the provisions of the *Workers' Compensation Acts*.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xvi to xix.

ADELAIDE CHILDREN'S HOSPITAL, ADELAIDE, SOUTH AUSTRALIA: Resident Medical Officers.
DEPARTMENT OF PUBLIC INSTRUCTION, MELBOURNE, VICTORIA: Medical Officer.
GRESSWELL SANATORIUM, MONT PARK, VICTORIA: Resident Medical Officer (male).
INNISFAIL HOSPITALS BOARD, INNISFAIL, QUEENSLAND: Assistant Medical Officer.
INSTITUTE OF MEDICAL SCIENCE, ADELAIDE, SOUTH AUSTRALIA: "Neale" Research Pathologist.
MOOROOPNA BASE HOSPITAL, MOOROOPNA, VICTORIA: Resident Medical Officers.
ST. GEORGE DISTRICT HOSPITAL, KOGARAH, NEW SOUTH WALES: Medical Superintendent.
TAMWORTH BASE HOSPITAL, TAMWORTH, NEW SOUTH WALES: Radiologist.
THE NEW SOUTH WALES MEDICAL DEFENCE UNION, LIMITED, SYDNEY: Assistant Secretary.
THE OTAGO HOSPITAL BOARD, DUNEDIN, NEW ZEALAND: Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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